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★ To all Republics — South American, North American, and everywhere throughout the world — the Statue of Liberty and Justice symbolizes perfectly the ideals which we must preserve regardless of sacrifice.

It is to that end that we, of Byron Jackson Co., have been and are devoting our utmost efforts. Beginning late in 1939, the Munitions Division has grown rapidly with increasing production of vital equpment. It is significant that the remarkable records obtained have been recognized by the simultaneous presentation of two Army-Navy "E" Production Awards in 1942.

This does not mean that we have forgotten you — our friends and customers — but first we must help win the war. Just as soon as the war is over, we will strive equally hard to furnish the products you need during the period of rehabilitation which should lead to a Golden Era of world peace and prosperity.

★ A todas las Repúblicas — Sud Americanas, Norte Americanas y en todo el mundo — la Estatua de Libertad y Justicia simboliza perfectamente los ideales que tenemos que conservar a pesar de todo sacrificio.

Con ese propósito la Compañía Byron Jackson ha dedicado y está dedicando sus mayores y mejores esfuerzos. Desde el fin de 1939, la División de Municiones ha desarrollado con rápidez la producción esencial de equipo y continua aumentando esa producción. Es significante que los archivos obtenidos han sido reconocidos por la presentación simultánea de dos Premios "E" por Producción por el Ejército y la Marina en 1942.

Esto no quiere decir que nos hemos olvidado de ustedes — nuestros amigos y clientes — sino que primero tenemos que consagrar todos nuestros esfuerzo a ganar la guerra. Tan luego como termine la guerra, lucharemos con igual empeño para proporcionarles los porductos que ustedes necesiten durante el período de rehabilitación la cual deberá ocasionarnos una Era Dorada de paz y prospridad mundial.

★ BYRON JACKSON CO. ★

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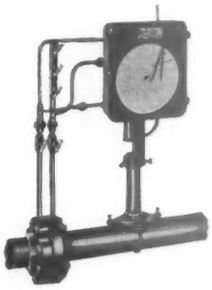

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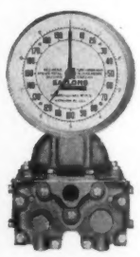

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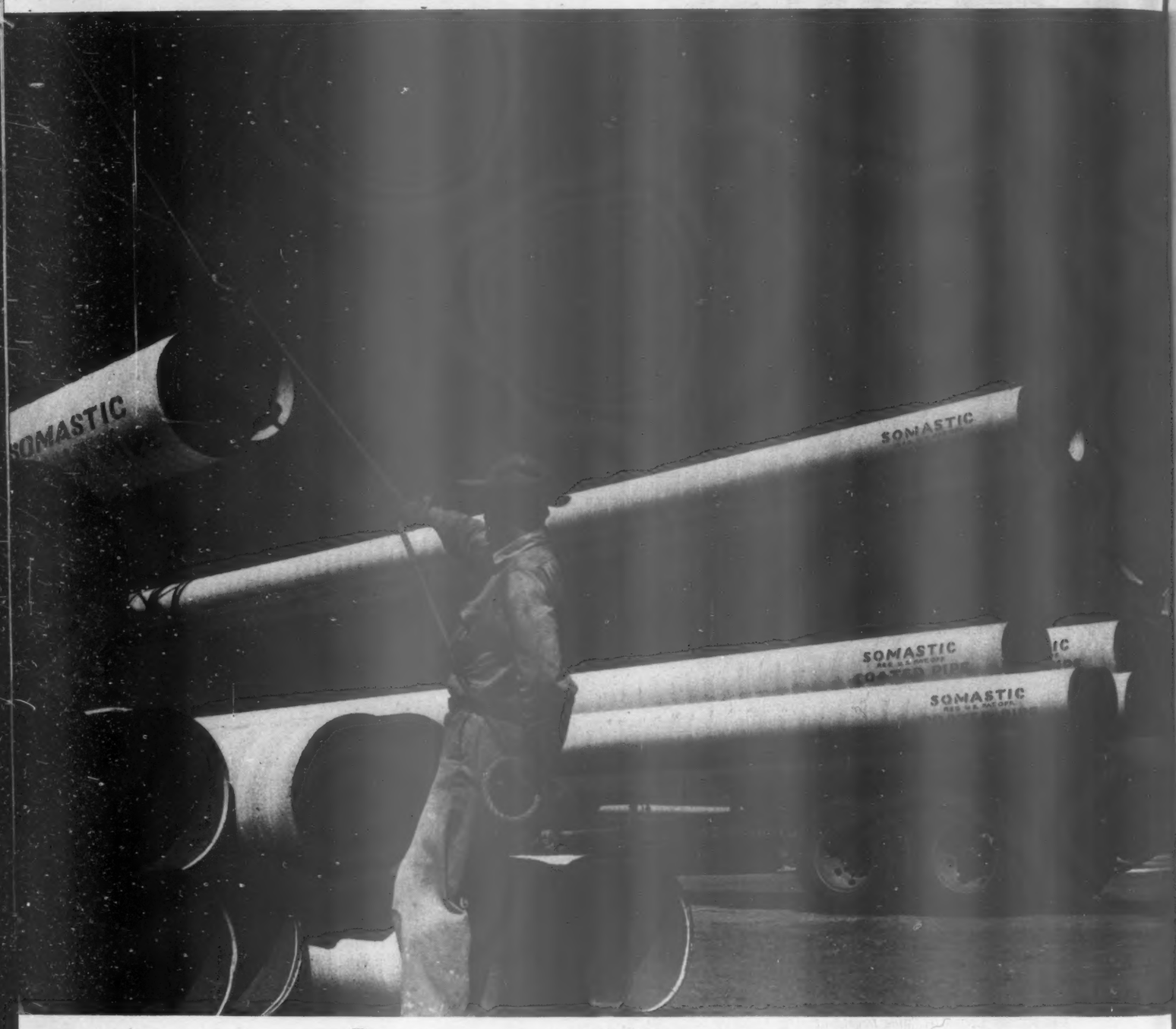

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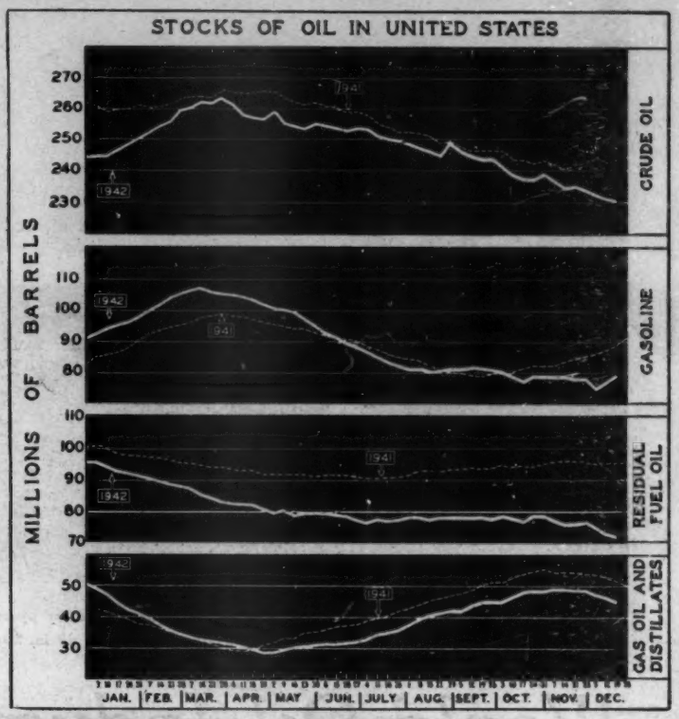
Trends

Refiners Hopeful That Shortages in Materials Will End



RECENT reports from Washington have been encouraging to refiners and others who have the major responsibility in seeing that the aviation gasoline, toluene, and synthetic-rubber programs are completed in accordance with the war plans. Those in the manufacturing divisions of the petroleum industry in recent months have been inclined to do the best they could under the circumstances and to say nothing about their many problems. It is no secret, however, that the engineering firms and the construction and operating divisions of refining and natural-gasoline companies have realized for some time that they must have greater consideration in Washington in regard to materials, equipment, and manpower if they are to complete their war-production programs on schedule. Evidence presented at congressional hearings are revealing actual conditions and these facts in turn are expected to bring the needed cooperation from those in charge of materials and manpower.

CRUDE PRODUCTION *3,896,765 bbl. daily average—down 12,985 bbl. One year ago 4,081,490 bbl.*

CRUDE STOCKS *231,742,000 bbl. as of Dec. 19 — down 154,000 bbl. One year ago 243,617,000 bbl.*

GASOLINE STOCKS *79,131,000 bbl. as of Dec. 19 — up 1,509,000 bbl. One year ago 90,668,000 bbl.*

RESIDUAL FUEL-OIL STOCKS *74,205,000 bbl. as of Dec. 19 — down 580,000 bbl. One year ago 94,047,000 bbl.*

GAS OIL AND DISTILLATES *45,880,000 bbl. as of Dec. 19—down 1,914,000 bbl. One year ago 51,988,000 bbl.*

REFINERY RUNS *3,667,000 bbl. daily week ended Dec. 19—down 77,000 bbl. One year ago 4,077,000 bbl.*

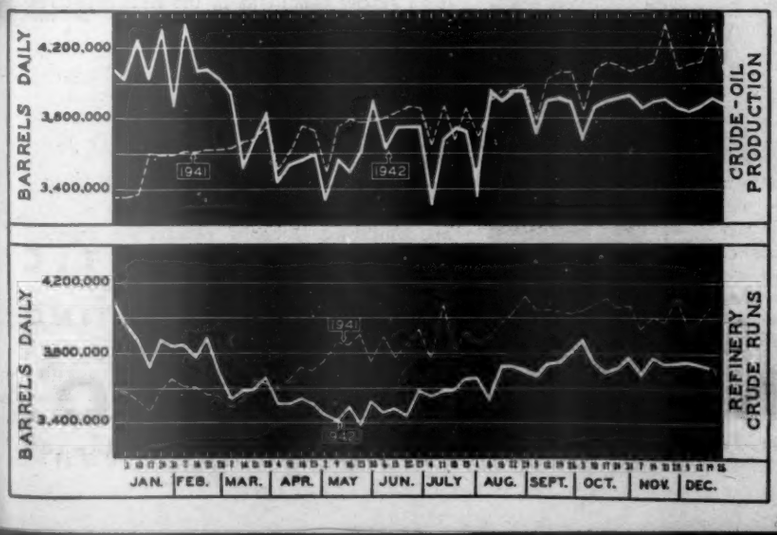
Refinery report delayed.

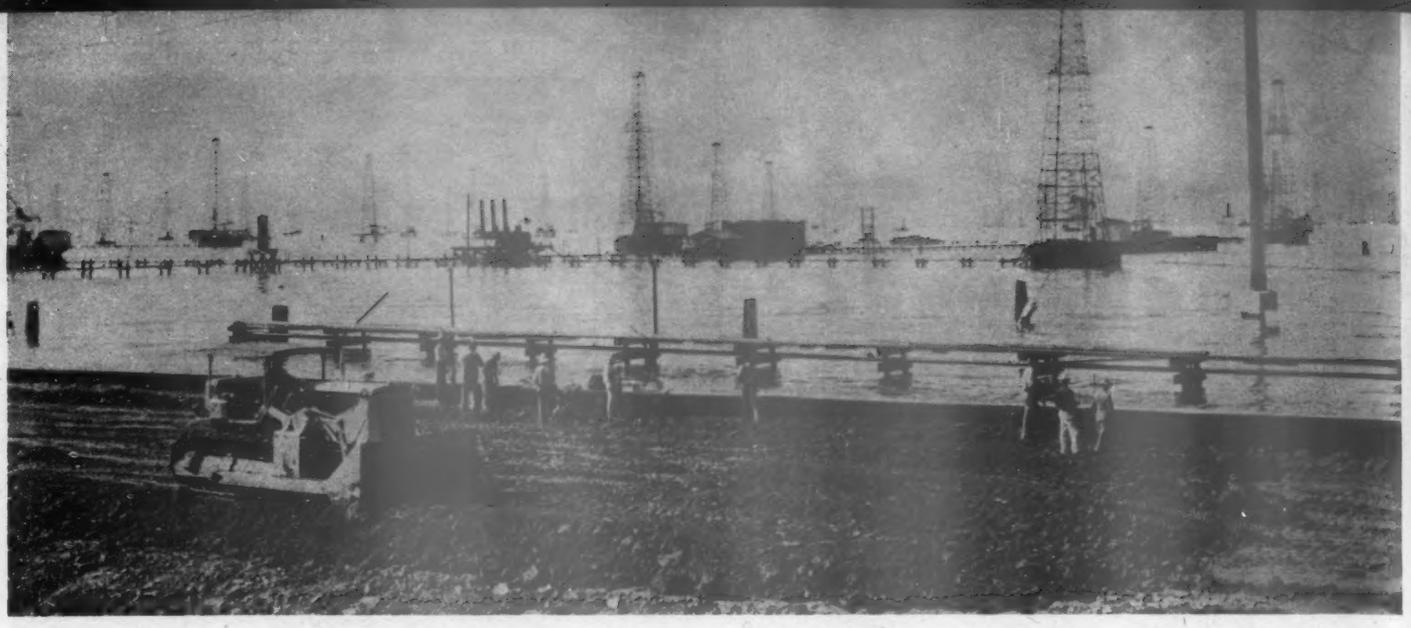
In the case of aviation gasoline the war program calls for the daily production of around 350,000 bbl. early in 1944. Present production is running behind the demands which have increased more rapidly than was expected and military officials are particularly anxious that output be increased substantially over the next 3 to 6 months. To that end top priority ratings have been given a number of projects which can be completed in the minimum time. While this may slow up some of the newer projects for a time it is believed that it will not only greatly increase output during the early part of 1943 but will in the end expedite the completion of all plants.

The petroleum industry's end of the synthetic-rubber program is even more unsatisfactory than that of aviation gasoline. It is pointed out in this connection that press reports revealing the completion or near-completion of plants producing intermediates and other rubber ingredients have tended to be misleading regarding the status of the program as a whole. Most of these plants to be completed during the first quarter of 1943 are of small capacity. The solution to the rubber-shortage program as refiners and the large rubber manufacturers have pointed out from the beginning of the present crisis lies in expediting the construction of the large butadiene plants of the petroleum industry some of which, owing to the materials and manpower shortages, plus the red tape of government ownership and direction, are hardly more than started. In regard to manpower those closest to conditions state that the situation is particularly critical in all refining areas where the war plants are under construction.

DAILY AVERAGE PRODUCTION FOR WEEK

	Dec. 26 crude oil	Dec. OPA quota all oils	Dec. 18 crude oil
Arkansas	73,350	77,300	73,700
California	775,250	815,000	780,250
Colorado	6,680	7,000	6,710
Eastern fields	91,100	107,600	92,300
Illinois	246,300	274,100	240,800
Indiana	16,300	17,700	16,300
Kansas	295,900	300,700	305,700
Louisiana	316,800	326,100	313,200
North Louisiana	*92,600*	.....	*90,200*
Louisiana Gulf Coast	*224,200*	.....	*223,000*
Michigan	59,800	63,800	58,900
Mississippi	56,550	50,000	59,100
Montana	22,910	24,700	20,070
Nebraska	3,000	3,400	3,000
New Mexico	95,600	99,700	99,120
Oklahoma	354,850	403,900	357,150
Texas	1,388,425	1,350,400	1,390,150
East Texas	*358,000*	.....	*358,600*
West Texas	*205,975*	.....	*209,300*
North Central Texas	*140,100*	.....	*139,900*
East Central Texas	*101,200*	.....	*101,500*
Texas Panhandle	*94,200*	.....	*93,200*
Texas Gulf Coast	*418,650*	.....	*420,250*
Southwest Texas	*67,300*	.....	*67,400*
Wyoming	93,950	94,500	93,300
Total United States	3,896,765	4,015,900	3,909,750
Total production, January 1-December 26, 1942			1,373,001,835 bbl.
Same period last year			1,380,580,220 bbl.





Offshore drilling and producing operations at Lake Maracaibo in Venezuela. Land masses around the lake recede 8 to 10 in. annually, requiring regular additions to the retaining wall

World Oil Industry Has Weathered Impacts of A Year's Global War

By H. STANLEY NORMAN

IMPACT of a full year of global war has left indelible marks on the world's oil industry and forced the most radical operating adjustments in history. But petroleum has emerged as one of the most indispensable resources in the hands of the United Nations, a conclusion long paramount in the minds of oil men but only now accepted categorically by top political and military leaders.

Other adjustments are in prospect to meet the shifting exigencies of war but, in general, the future outlook is bright and reasonably static in comparison with the past 12 months.

There is reason to believe that materials for drilling additional wells, for expanding manufacturing facilities and for enhancing transportation will become more freely available even under the rigid regulation on uses of critical metals. Most of the shock from sudden shortages of critical materials has been absorbed, observers contend. They add that the cold realities of military necessity, plus the benefits from experience in management of materials, dictate improved operating conditions for the duration and, of course, for the postwar period too.

Steel Shortage Prime Deterent

Losses of tankers sunk by submarine and surface warfare and the lengthened supply lines caused chiefly by the fall of the Netherlands East Indies and hazards of Mediterranean navigation were the chief reasons for the most radical changes in producing operations. However, the lack of sufficient steel to carry on normal drilling operations in producing countries figures in the general pattern of enforced preferential consumption.

There are no reliable data available on petroleum supply conditions in the Axis countries although reports assembled from bits of military intelligence indicate that Germany's reserves are being depleted beyond a point of safety and that stocks for the manufacture of lubricants are particularly critical. Petroleum shortages, long delayed in Germany because of intense preparation for the struggle that is now in its third year, have been present from the outset in Italy. Ambitious plans for drilling more wells in Albania and southwest Hungary indicate the urgency of replenishing Axis petroleum supplies.

Physical aspects of foreign operations, closely tuned with a regular flow of equipment, were the first affected by equipment shortages. Now, however, in the more advanced stages of war adjustments, the oil industry's basic relations with foreign governments, particularly in the Western Hemisphere, are up for review and probable modi-

fication. Negotiations, it is understood, have been completed between private companies, the Department of State and the Venezuelan Government for revision of the basic petroleum law in that country. Venezuela's oil operations, because of their inseparable link with marine transportation, have been the hardest hit of any country, except those actually invaded. Dependence of the national economy on petroleum has made the year's reduction of more than 78 million barrels in production and exports a particularly difficult problem. While Venezuela is anxious to increase the national revenue from its petroleum resources, the administration is also desirous of expanding all phases of operations. With the dual objectives as nucleuses, Venezuelan officials are embarked on a program of achieving the desired increase in national oil revenue by improving the inducements for operating companies.

Tangible evidence of revised oil relations between governments of the Western Hemisphere came last week with execution of a trade agreement between the United States and Mexico, terms of which automatically extend to other favored nations. The duty on all crude and fuel oils exported to this country from favored nations was reduced to ¼ cent per gallon and quotas were eliminated for a period of 3 years, unless sooner terminated by an escape clause. Since December, 1939, foreign oil producers have enjoyed reduced import duties on crude and fuel oils up to 5 per cent of the United States domestic refinery runs. Quotas for individual countries were fixed on a percentage basis of their shipments to this country during 1938 and were adjusted each year in relation to domestic refinery runs in the preceding 12 months.

Mexico's Position Improved

Mexico, so far as its petroleum export trade with the United States was concerned, operated at a disadvantage under the Venezuela trade treaty which was the previous basic document authorizing limited entry of oil at reduced duty. Complete elimination of quotas on crude oil and fuels will, if tanker facilities are available within the 3-year limit of the treaty, make it possible for Venezuela, Colombia, Mexico and the Netherlands Kingdom to recapture part of the war-expanded European market in this country. Rigid control of tankers plus the almost certain conclusion that no more will be authorized than needed to meet absolute essential demand indicate that imports will be well within peacetime quotas for duration of the war. However, the more liberal tariff policy extended to petroleum imports from friendly nations—South American producing countries are the only ones in position to derive benefit—may vitally influence the long-term outlook for Latin-American oil.

Previously, Mexico's crude and fuel-oil exports to this country were based on 1938 shipments. During the forepart of that year, Mexico expropriated private oil properties and imports by United States consumers dwindled to an insignificant percentage of total foreign petroleum receipts. Mexico was included with "other" beneficiaries under the Venezuelan trade agreement and a quota at the reduced rate of ¼ cent per gallon aggregated 3,592,000 bbl. in 1942 for all nations in this classification. This compares with a total half-duty quota of 70,440,000 bbl.

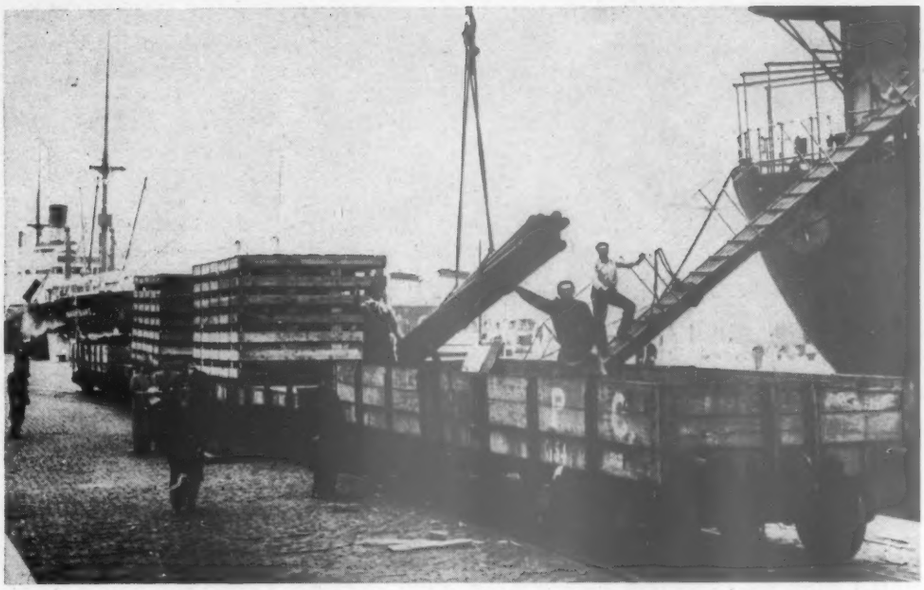
Reduction in the import duty on petroleum was only one phase of the general trade pact with Mexico. Among the concessions made by Mexico are the freezing of present import rates on automobiles, trucks and tractors; a reduction of 50 per cent in the duty on machinery and appliances and a 17 per cent decrease in the rate on radios and radio equipment.

La Horca gas plant in Colombia, one of the operations carried out by Tropical Oil Co. on Des Mares concession

The list of commodities upon which the United States received tariff reductions totals 76 while present Mexican duties on 127 other articles of trade were pegged at their present levels. Sixty items exported by Mexico to the United States are affected by the agreement.

Full details on petroleum imports are no longer available because of their possible value to the enemy but during the first 9 months of 1941, the latest period for which inclusive data are available, receipts in this country of crude and all refined products averaged 250,000 bbl. daily. Quotas for 1942, at the reduced duty extended by the Venezuelan trade agreement of 1939, provided for imports of 193,000 bbl. daily. However, "other" countries and Colombia filled their quotas about the middle of the year, or earlier, and the permissive figures are not, therefore, necessarily an indication of the actual import rate.

Modification of the United States' policy on petroleum imports may be only temporary but other developments during the year indicate that the State Department leans toward sympathetic consideration of the nationalistic trend in South America. The State Department, of course, has not condoned expropriation as a principle but was influential in clearing the record of a dispute between Mexican subsidiaries of Standard Oil Co. (New Jersey) and the government of that country. Also, the State Department was instrumental



Unloading tubular goods from the plants of United States manufacturers at a port in Brazil where seven drilling rigs are now engaged in exploratory operations

in settling an issue between Standard of New Jersey and the Bolivian Government. It is impossible to determine how important was expediency for a solid hemispheric front in State Department insistence for settlement of private company disputes with South American nations.

Reviews that appear elsewhere in this issue probe deeper into the increasing jurisdiction assumed by the State Department over foreign oil operations. This development is doubtless among the most significant of the year and one that may chart a permanent policy, at least through the postwar period when industrial nations are resuming their contest for consumer markets. Foreign oil operations are among the most complex economic and political problems of the war. In the first place, "good neighbor" nations are practically entirely dependent on the United States for petroleum equipment. Furthermore, the American flag tanker fleet forms an indispensable link between Latin-American refineries and consumers.

The U. S. Government has literally "bent over backward" to avoid possible charges of discrimination in the distribution of available supplies and in allocation of transportation facilities. Loans by the Export-Import Bank, a subsidiary of the Reconstruction Finance Corp., have been made to Mexico and Bolivia for rehabilitation and expansion of oil operations and facilities in those countries. An American commission recently completed an appraisal of Mexican petroleum conditions which, it is now indicated, was one of the factors pertinent to the trade agreement. Recommendations of the commission have not been made public but, it is understood, provisions will be made for shipment of producing and refining equipment to Mexico.

Lowered import duty on Mexican crude oil and petroleum fuels may figure in attaining a closer balance between domestic refinery production and the increased demand for residual oils. Water routes from Mexican oil ports to terminals in the United States are the shortest between all other exterior sources of supply and, consequently, would be the most easily protected with the least tieup of patrol equipment. Mexico's capacity to export petroleum has been diminished during the past 4 years and before the country can supply significant quantities of oil to this or other American republics an extensive rehabilitation program must be completed.

Three Increase Production

Argentina, Trinidad and Peru were the only Latin areas able to increase their crude-oil production in 1942. An increase of between 8 and 9 per cent in Argentina is indicated on the basis of 10 months' operations.

Trinidad is a concentration point for various war materials and a refueling station for bombers ferried to Africa and Asia. Ship convoys are formed near Trinidad and the island's fields and refineries supply much of the fuel for marine operations. Currently, Trinidad is producing between 75,000 and 100,000 bbl. of crude oil daily, largely from fields in operation previous to the outbreak of war. One new field has been discovered since the war started.

Companies operating in Trinidad are temporarily adequately supplied with tubular goods placed in inventory before hostilities started. The big need in Trinidad, according to reports in this country, is for pumping units for installation in wells where pressures have dwindled below the minimum requirements for natural production. Trinidad Oilfields Operating Co., Ltd., a subsidiary of Standard Oil Co. (New Jersey), has transferred its operations to other British companies on the island and moved its personnel to Venezuela.

Trinidad operators have completed a consolidated schedule of equipment needs and it is be-

ESTIMATED WORLD PRODUCTION

(Thousands of barrels)

Country—	1942	1941	Change
United States	1,385,500	1,404,182	—18,682
U.S.S.R. (1)	214,000	238,000	—24,000
Venezuela	150,000	228,131	—78,131
Iran	75,600	64,150	+11,450
Rumania	37,800	38,450	—650
Mexico	37,000	42,705	—5,705
Trinidad	27,375	21,150	+6,225
Argentina	23,275	21,765	+1,510
Iraq	14,600	10,000	+4,600
Peru	13,150	11,925	+1,225
Colombia	10,600	24,639	—14,039
Canada	10,450	10,123	+327
Germany (2)	10,000	9,750	+250
Netherlands East Indies (3)	9,000	61,000	—52,000
Egypt	8,000	7,800	+200
Bahrein Island	7,800	7,070	+730
Saudi Arabia	6,000	5,750	+250
Hungary	4,400	3,300	+1,100
Japan (4)	3,800	3,800	.....
Burma	2,500	7,900	—5,400
British India	2,500	2,245	+255
Ecuador	1,800	1,560	+240
Italy (5)	1,350	1,250	+100
Bolivia	300	275	+25
Others	200	205	—5
Total	2,056,900	2,227,125	—170,225

(1) Includes part of Sakhalin. (2) Includes Austria, Czechoslovakia, Poland, France. (3) Includes Sarawak, Brunei. (4) Includes part of Sakhalin, Formosa. (5) Includes Albania.

INDEX FOR 1942 READY

The complete editorial index of The Oil and Gas Journal for 1942 will be off the presses in January but, deviating from previous custom, it will not be incorporated in a regular issue. The 1942 index, bound separately, will be sent without charge to all subscribers requesting a copy. Address requests to Circulation Department, P.O. Box 1260, Tulsa.

ing cleared through the Foreign Division of the Petroleum Administration for War, the Board of Economic Warfare and the State Department. This procedure for handling foreign distribution of petroleum equipment has become general practice in order to direct the flow of materials to the services having greatest potential value to the war program, much as the priority system is intended to function in this country.

Rumanian Reports Conflict

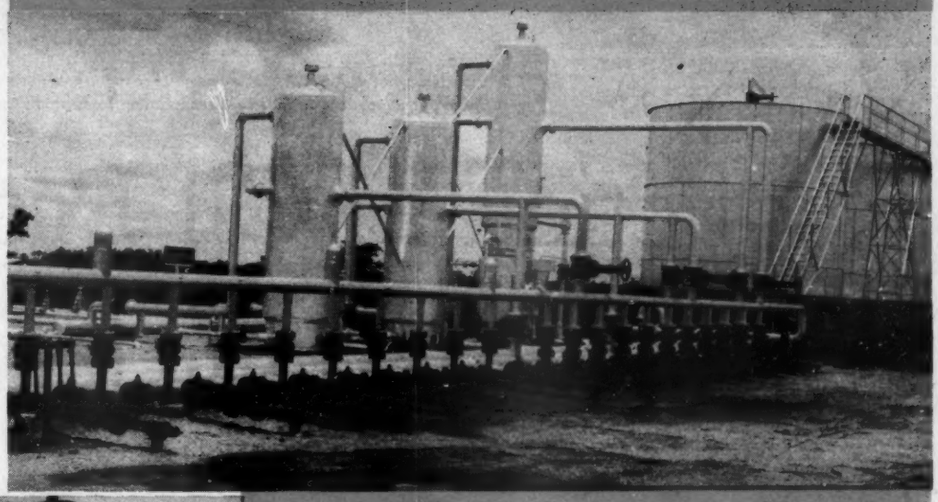
Reports from Rumania, chief source of Axis petroleum supplies, are conflicting and probably as unreliable as they are varied. Latest information on Rumanian operations indicates that production this year may not exceed 30,000,000 bbl., which compares with output of 43,231,000 bbl. in 1941 and 45,996,000 bbl. in 1940. Rumanian exports to Germany in 1941 totaled, according to European press reports, approximately 22,000,000 bbl., or nearly 50 per cent of the production. A reduction of 10 to 15 per cent, or to around 20,000,000 bbl. is reported for this year.

Other European reports credit the Lipse field in southwestern Hungary with an important increase in production to about 2,500,000 bbl. annually. At start of the war, when European Gas & Electric Co. was in charge of operations in the Lipse field, production averaged around 3,000 bbl. daily. Exploration and development have been intensified by the necessity of shortening supply lines and making all possible areas in Central Europe self-sufficient in petroleum supplies.

German engineers are also reported to have increased the pace of operations in the Zisterdorf field near Vienna in Ostland (formerly Austria), at Gbelly in Slovakia, Pechelbronn in Alsace, at Kutina in Croatia and at Saint Marcet, France.

Several large refineries in the northern part of France were being removed to points in the interior of Germany where they would be less vulnerable to bombing attacks, although British sources discounted these reports.

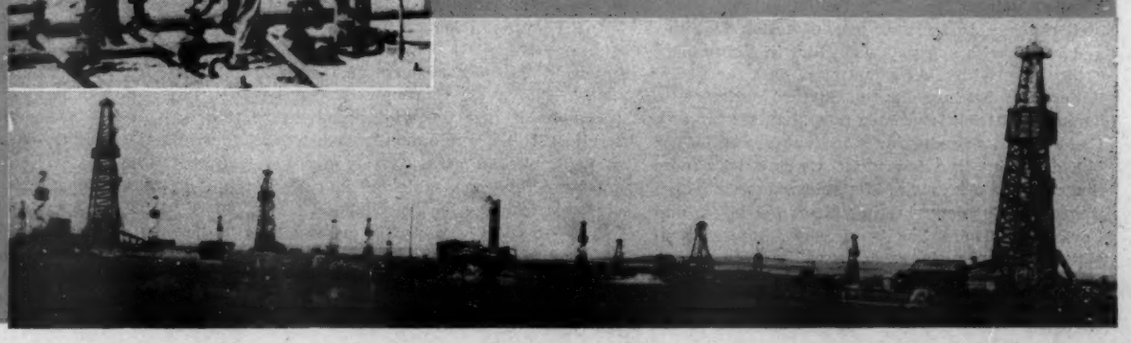
One of the Trinidad refineries which is now producing aviation gasoline for the Ferry Command and other war requirements



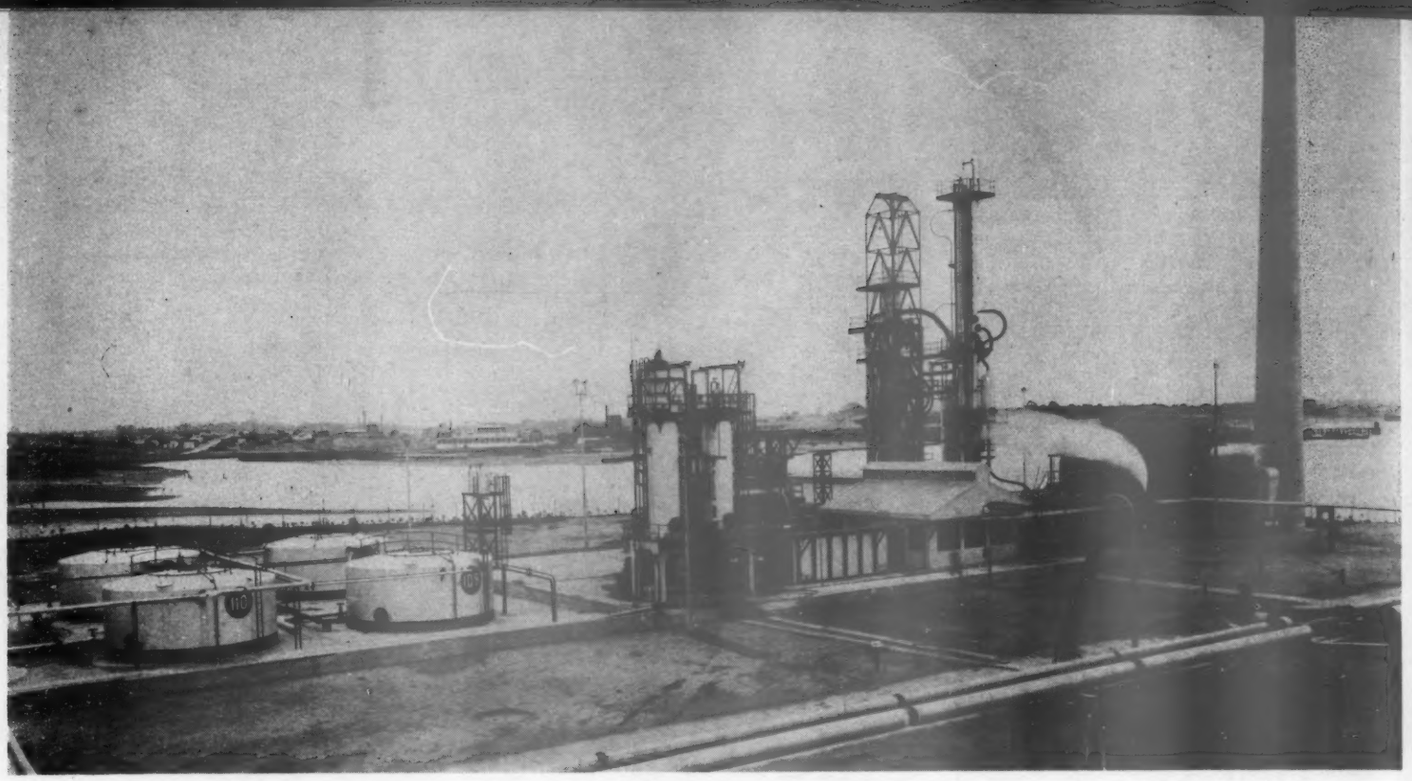
A typical manifold, separator installation, and storage battery in a Venezuela field

Installing flow lines, valves and connecting up separators in a U.S.S.R. field behind the Ural Mountains

Soviet oil workers open the gate valve and watch flow from one of the wells in the new Ural-Volga producing area



Panorama of a Ural field showing continued use of wooden derricks and a central steam plant for drilling power



The cracking unit at A.N.C.A.P.'s refinery in Uruguay is one of the foreign refineries dependent on marine transportation from producing countries

Reduction in Oil Production Is Caused Entirely By Warfare

By J. P. O'DONNELL

THE most substantial decline in crude-oil production in the history of the industry occurred in 1942 when it dropped 170,225,000 bbl. from the 1941 all-time high of 2,227,125,000 bbl. to an estimated 2,056,900,000 bbl. Previously the greatest decline had been in 1930 when production declined 75,000,000 bbl. Despite the volume of the 1942 decrease, it represented only 8 per cent of the estimated world production. Even though the third largest of the three major producing areas of the world was devastated early in the year, lack of transportation facilities rather than actual warfare itself accounted for the bulk of the 1942 decline. It is estimated that in the areas where production declined, 75,000,000 bbl. were lost as a result of destruction in the southwestern Pacific area and in the Maikop field of western Caucasus while 125,000,000 bbl., virtually all of it in the Western Hemisphere, were lost as a result of the lack of transportation.

Venezuela, where production dropped almost 80,000,000 bbl. from the year before, suffered the greatest volume loss. This reduction was attributed entirely to lack of transportation facilities and in no wise suggests a decline in Venezuela's ability to produce. As a matter of fact the potential of the most important of South America's producing countries is greater now than a year ago. In January its production was in excess of 700,000 bbl. daily but in a few months was cut by more than half as a result of the submarine campaign waged by Germany in the western Atlantic and Caribbean. There has been some improvement since but Venezuela, as a naturally large exporter, is controlled by the availability of tankers and no immediate, large-scale improvement can be anticipated.

Venezuela's long-range prospects are excellent. In spite of the lack of demand, oil companies operating in Venezuela have pursued exploratory campaigns and a number of new discoveries or extensions were opened this year. Internal transportation facilities have been improved by the construction of the 100-mile Santa Barbara-Puerto la Cruz line and additions to existing lines. A considerable amount of oil-field equipment, including a large number of portable units, is awaiting shipment to Venezuela from this country. Cargo carriers are at a premium, however, and much of the equipment imports arrive as deck loads on tankers. Expansion of refining facilities at both Aruba and Curacao, where the bulk of Venezuelan crude is refined, also favors the country's oil prospects.

Invaded Properties Destroyed

The largest proportionate losses were, of course, in the Netherlands East Indies and Burma. Before the war and before the East Indies refused to ship more oil to Japan, this region was producing in the neighborhood of 75,000,000 bbl. annually. The very thorough destruction of the Burma fields and the widespread destruction in the East Indies undoubtedly reduced production to negligible proportions. It is questionable if the Japanese have been able or have even found it advisable to bring back production.

Premier Tojo is quoted as saying East Indies oil production "is higher now than had been hoped despite enemy destruction and the supply of oil for Japanese is assured for duration of the war. This situation relieves any apprehension on the subject of the war's future course."

Tojo's statement ignores the fact that a controlling factor in East Indian production is the ability to export and not only has Japan's tanker fleet been heavily damaged but considerable distances separate the Indies from points Japan must supply.

British economic warfare experts believe that Japan is drawing heavily on reserves built up before the war so that the need for imports has necessitated all advisable rehabilitation of southern Pacific fields. They believe that Japan is concentrating on the Seria fields of British Borneo and the Tarakan fields of Netherlands Borneo. Shallowness of production, comparative proximity to Japan, and the fuel-like quality of unrefined Tarakan oil make this assumption logical. Withdrawals from reserves and a production capacity, including eight synthetic plants, of only about one-third of requirements are believed to have placed Japan in a critical position with respect to oil. This may account in part for her reduced activity on her farflung fronts.

Other major changes in the estimated world crude-oil production table were in Colombia and Russia. While Venezuela suffered the greatest volume loss of Latin-American countries, the greatest proportionately was in Colombia. Production in this country, which borders on both the Caribbean and Pacific, was reduced about 57 per cent. Colombia's production had advanced to 83,500 bbl. per day in February and then fell rapidly to 6,500 bbl. in October.

Colombia's trouble was due in part to the fact that both her pipe-line outlets lead to the oil-fat Caribbean and there is no outlet to the west where there is somewhat of a shortage. In this

respect Colombia's present position is similar to that of the United States which is unable to make normal deliveries to its East Coast. No discoveries of importance were made in Colombia this year and full development of the newest source of production, Casabe, has been delayed by lack of demand and lack of transportation facilities.

Russia lost the Maikop fields in Kuban Province where production in 1941 reached an estimated 17,000,000 bbl. Wholesale destruction of this field undoubtedly rendered it valueless to Germany. Of probably even greater consequence to Russia than the loss of Maikop and the Krasnodar refinery was the temporary, partial control the Nazis maintained over the Volga which constitutes Russia's greatest internal distribution system. It can hardly be questioned that as soon as Sevastopol fell and it became evident that the Nazis were headed for the Volga, Russia exerted every effort to build up stocks north of the fighting area and used the Volga to the fullest advantage. Therefore while complete control of this strategic artery was lost for some 10 weeks, it is now apparent that it was not a vital loss and is now probably in Soviet service.

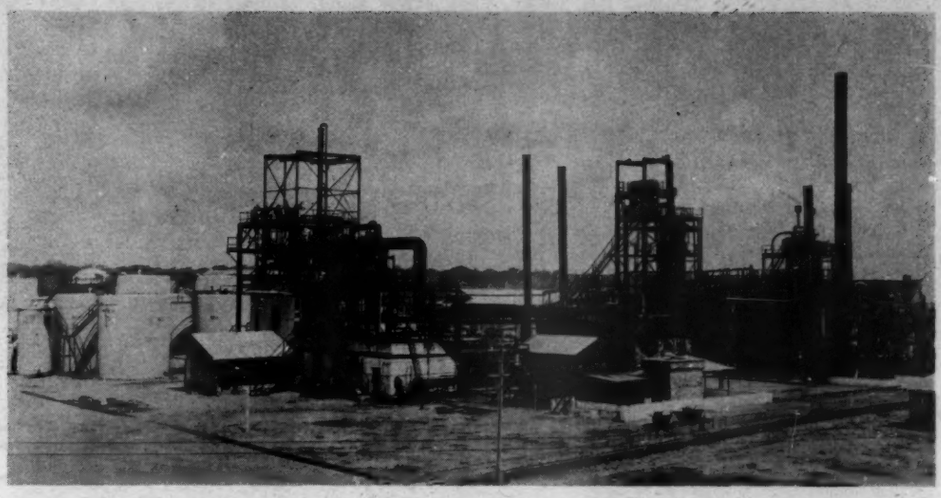
Russians Offset Losses

Destruction of Maikop and the temporary loss of control of the Volga were also undoubtedly offset by a speed up in the exploitation of the Ural-Volga fields. A considerable volume of new oil-field equipment was sent from this country to Russia during the past year and the bulk of it was probably consigned to these least developed of Soviet fields. In addition to sending oil-field equipment, the United States is also in the process of dismantling several refineries which will be shipped to Russia for reerection there and the rights to our refining processes have also been made available to the Russians.

There is ample evidence to show that as deep as the German penetration into Russia has been, it has not deprived the Soviets of of sufficient oil or means of transportation to impair their ability to resist or to take the initiative. Capture of Maikop meant only minor success for the Germans who, according to Premier Stalin, expected to be in Baku September 25. In the middle of October, Reich Minister of Propaganda Dr. Joseph Goebbels outlined German ambitions when he said, "When the time comes for a blow at the Caucasus, and we have completed it, we will control the richest oil region in Europe."

Germany's inability to acquire and utilize new sources of production is believed to have forced the Nazis to draw on stocks which have not been substantially replenished by conquest for more than a year. Germany is also suffering transportation difficulties. British and American bombing of terminals in Germany have undoubtedly slowed down the movement of oil. United Nations air and sea forces have destroyed numerous Axis tankers in the Mediterranean and thereby contributed measurably to the crushing defeat of Rommel. According to unverified reports, Germany has had to fall back on air transportation to supply fuel to armies in the North Caucasus and in Africa.

It is possible that Germany has managed to increase crude-oil production somewhat in her own fields and those of occupied countries. Whatever real increases have developed in Europe are believed to be limited to Hungary, which is now probably producing well in excess of her own demands. Hungary's production is estimated at 12,000 bbl. per day but with the development of a new field east of the Danube it could conceivably reach 13,000 to 17,000 bbl. per day. Rumania's production is controlled to some extent by available transportation and it is believed by competent observers that it has continued to decline despite statements attributed to Prime Minister Antonescu that it had reached a rate equivalent to a 10 per cent annual increase. Rumania passed a new petroleum law opening up new areas for exploration but it could have had no immediate effect on production.



Tropical Oil Co.'s refinery at Barrancabermeja, Colombia, curtailed operations this year because of the difficulty of maintaining transportation lines to large consuming markets

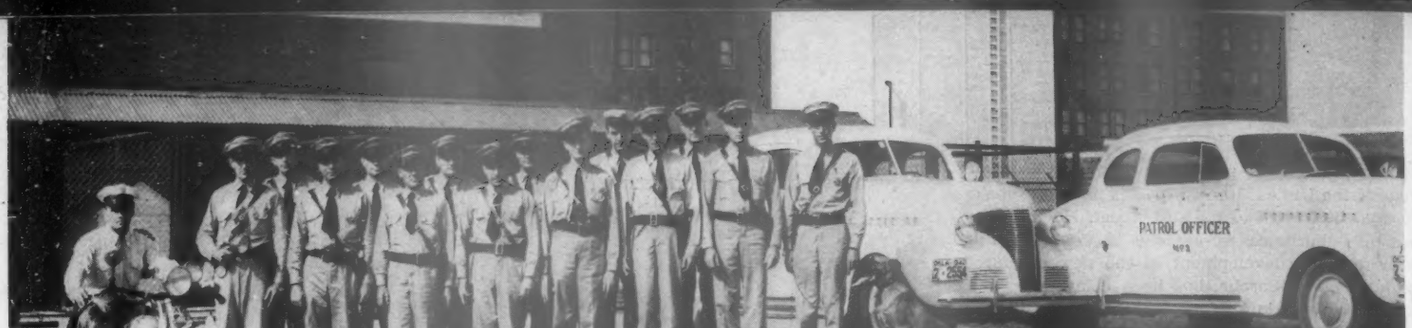
The only important increases in production during 1942 are believed to have been limited to the Near East and some scattered areas in the Western Hemisphere. Loss of the far eastern producing and refining capacity undoubtedly opened new opportunity for the Persian Gulf region as did the construction of railroads from the head of the Gulf through Iran to Russia. When the United Nations gain control of the Mediterranean, as seems likely as a result of the North African operations, more benefit might accrue to the Near East. Haifa and New York are almost equidistant from London so that it is possible

(Continued on Page 50)

LATIN AMERICA PETROLEUM PRODUCTS DEMAND PER CAPITA*

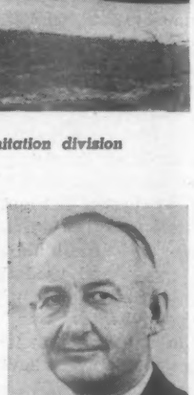
Country—	Demand (1,000 bbl.) Five products	Demand (1,000 bbl.) Gasoline	Population (thousands)	Per capita consumption Five products	Per capita consumption Gasoline
Argentina	31,046	8,531	12,762	2.45	0.79
Bolivia	361	186	3,426	.11	.05
Brazil	7,690	3,117	43,247	.18	.07
Chile	5,376	910	4,627	1.16	.20
Colombia	3,739	1,229	8,391	.45	.15
Ecuador	253	160	2,757	.09	.04
British Guiana	131	28	337	.39	.08
Dutch Guiana (Surinam)	22	4	176	.13	.02
French Guiana	22	4	37	.59	.11
Paraguay	75	48	936	.08	.05
Peru	2,998	827	6,600	.45	.13
Uruguay	4,875	860	2,093	2.33	.41
Venezuela	2,378	1,345	3,452	.69	.39
South America	*58,966*	*17,249*	*88,841*	*.66*	*.19*
Mexico	19,384	4,209	19,809	.98	.21
British Honduras	28	12	57	.49	.21
Costa Rica	214	150	616	.35	.24
Guatemala	1,030	130	3,044	.34	.03
Honduras	745	370	1,000	.75	.37
Nicaragua	208	115	1,134	.18	.10
Panama	309	195	577	6.29	.62
Panama Canal Zone	3,320	160			
Salvador	164	60	1,665	.10	.04
Central America	*25,402*	*5,401*	*27,902*	*.91*	*.19*
Guadeloupe	57	42	304	.19	.14
Bahamas	41	30	67	.61	.45
Barbados	109	45	190	.57	.24
Bermuda	126	14	31	4.07	.45
Cuba	5,085	820	4,109	1.24	.20
Dominican Republic	304	108	1,581	.19	.07
Grenada	14	10	88	.16	.11
Haiti	92	47	3,195	.03	.01
Jamaica	1,915	230	1,139	1.68	.20
Martinique	108	70	247	.44	.28
Netherlands West Indies	16,170	250	91	177.69	2.75
Porto Rico	2,040	600	1,723	1.18	.35
Trinidad	4.855	140	465	10.44	.30
West Indies	*30.916*	*2,406*	*13.230*	*23.37*	*.18*
Grand total	115,284	25,056	129,973	.89	.19

*From data by John D. Gill, director of Atlantic Refining Co.



A view of Continental Oil Co.'s guards in front of the bullmastiff kennels. Right below: Joe S. Boylan, superintendent of safety and sanitation division

Trained Dogs Supplement Refinery Guard System



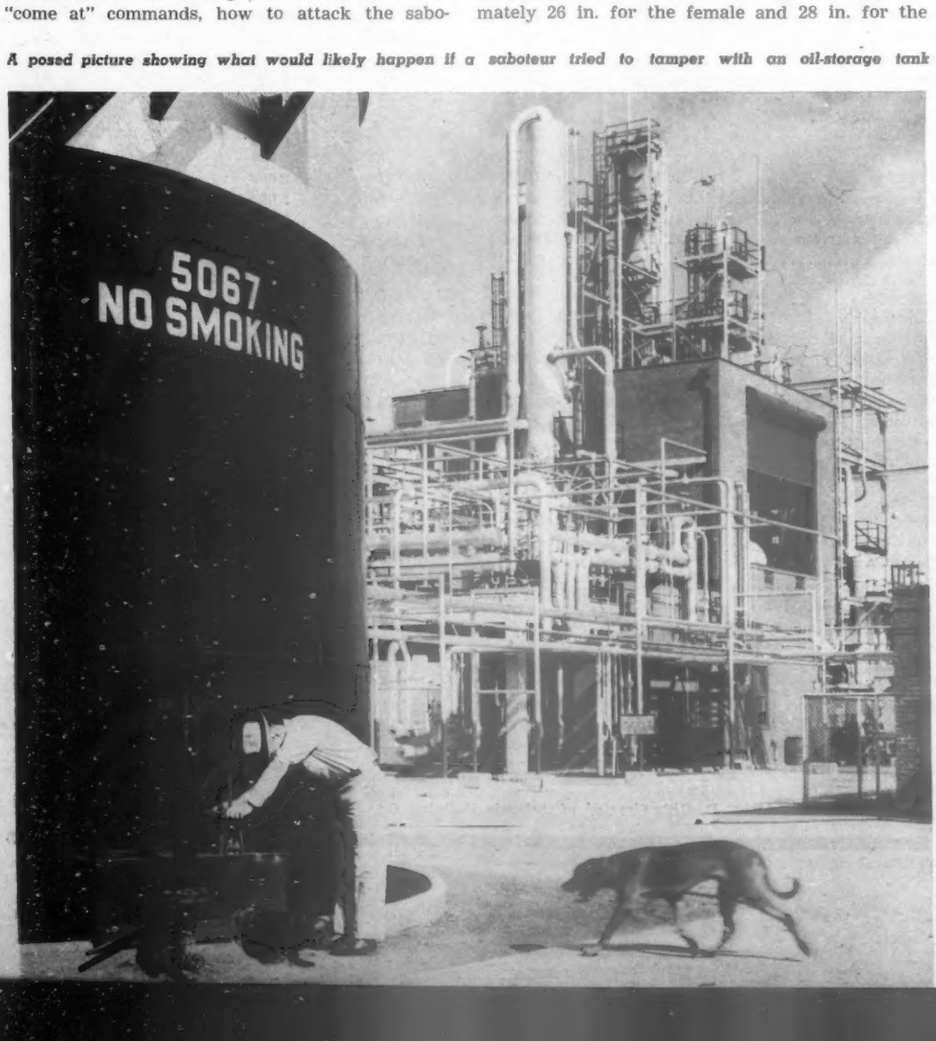
AS a part of the Continental Oil Co.'s vast oil-property protective program, seven bullmastiffs are on sentry duty at the company's Ponca City, Okla., refinery, which has been designated as the breeding and training kennels for more dogs to serve other company properties. Dogs have already been assigned to refineries at Lake Charles, La., Wichita Falls, Tex., and Denver, Colo., and others will soon be ready to go on guard elsewhere.

Training the bullmastiff to work night patrols with Continental Oil Co.'s armed guards is a painstaking task. For that job he must know how to heel, to stand, to respond to "come on" and "come at" commands, how to attack the saboteur, and to hold the snooper until his patrol master and other guards handle the situation in proper fashion.

Breeding stock for the bullmastiffs now in Continental service was originally imported from England by Dan Moran, president of the Continental company, who has privately trained and developed this breed for several years for his personal use.

The average bullmastiff is a powerfully built animal with broad shoulders and tapering hindquarters, smooth, short, fawn-colored hair, V-shaped pendant ears, strong jaws and a long, swooping tail. The shoulder height is approximately 26 in. for the female and 28 in. for the male. The female weighs around 100 lb. and the male 125 lb. These industrial watchdogs have strength and courage, the same characteristics which made their mastiff ancestors famous as war dogs and lion fighters. In temperament the bullmastiff is gentle and docile to friends, ferocious to enemies.

A posed picture showing what would likely happen if a saboteur tried to tamper with an oil-storage tank



The dogs spend most of the daylight hours resting in kennels or in exercising and training. They eat only twice daily and their diet is outlined by canine-food authorities. Twice weekly their meal includes fresh meat, cod liver oil and cereals. Meal times for the bullmastiffs are 8:30 a.m. and 4:30 p.m. The afternoon meal is light to encourage the hunting spirit in the animal. At nightfall the dogs go on duty at various patrol stations, each with an armed guard.

The Continental Oil Co.'s armed patrol is under the supervision of Joe S. Boylan, superintendent of the safety and sanitation division. Floyd Story is chief patrol officer.

Nineteen armed guards make up the patrol at the Ponca City refinery and these men are responsible for protecting the property and the safety of 2,000 employes.

The Continental guard is 5 ft., 11 in. tall, weighs 180 lb., and despite his 40-year-average age he is agile and strong. He learns discipline and order by doing military drill in the company's own gymnasium. An officer of the U. S. Provost Marshal's office periodically inspects this training to see that it is properly done.

Before a man is selected as a Continental guard he is thoroughly investigated by the Federal Bureau of Investigation. The training program for the armed guard is complete. He learns to fire a pistol accurately, to handle a submachine gun, disarmament and defense methods both with and without the aid of his bullmastiff, to detect sabotage, to report anything dangerous to plant or personnel. Each guard must take the oath of allegiance to the United States and he then is commissioned a deputy sheriff with full authority to enforce the law. All guards carry side arms and the wear the badge of office.

Assisting the armed guards in Continental's watch over its property and personnel is a third group, the gate watchmen. Fifteen watchmen are employed. No one passes them without complete identification.

All trucks or other vehicles entering plant gates

are inspected and their contents checked. Nothing is above suspicion. Refinery visitors are investigated before passes are issued. Those not actually employed by the company must be accompanied by armed guards even though they may be on bona fide business missions.

But, to get back to the canine patrol, to learn more of their training, of the hours of patient work which must be performed in their preparation for actual duty.

Primary training of the bullmastiffs in Continental's service was conducted by Harry Schoonover, Houston, Tex., a man with many years of experience in the training of circus animals and the basic and advanced training has been conducted by Chief Patrol Officer Story, a veteran police officer who has had much success in training dogs for guard duty.

Bullmastiffs are ready for "school" at various ages—the average age is 8 months. At 6 months the young dogs are still in the puppy stage, but that is the time when a dog is taught to recognize its own name, the first step toward obedience. Later come the lessons in which the dog is taught to heel, lead attack, follow, stand. Each lesson requires from 3 to 15 minutes and the primary training course takes from 1 month to 6 weeks.

Upon completion of primary training the bullmastiffs enter the Ponca City kennels where advanced training is administered by Mr. Story and they are graduated to sentry duty. Here the dogs are trained to range in a zigzag manner, to circle tanks and buildings to find the saboteur, to jump fences or gates in their search, to guard, to hold a prowler at bay until the master arrives, or to attack when necessary.

The Continental company's bullmastiff kennels were established in the belief that the dog is as important in twentieth-century warfare as it was to the British armies and Roman legions centuries ago. Subscribing to this belief are the Allied Army commands. The U. S. Army has a new K-9 corps which takes training similar to that conducted by Continental. The British Government constantly uses dogs and has issued a plea for more dogs capable of performing war duties.

●

OPA Authorizes 3-Cent Margin At All Gasoline Retail Stations

WASHINGTON, D. C.—To help retail-gasoline dealers remain in business despite curtailment of sales resulting from motor-fuel rationing, the Office of Price Administration December 26 established a minimum operating margin of 3 cents a gallon at filling stations throughout the nation.

OPA's action extends to dealers in all states the same provisions which have heretofore been in effect only in the East Coast area where gasoline rationing began last summer. It is a part of OPA's program to aid small business establishments to withstand the impact of wartime expedients.

Prior to gasoline rationing many stations enjoyed a volume of business which permitted profitable operation on gallonage margins of less than 3 cents, and their prices were frozen at the lower levels by maximum price regulations. With volume of sales reduced by rationing, such stations are hard pressed to make operating expenses.

The action was taken by Amendment 14 to Maximum Price Schedule 137—petroleum products sold at retail—and affects only those station prices which allow less than a 3-cent margin.

To protect the consumer, OPA requires operators who take advantage of this provision and who increase their prices, to file with their war price and rationing boards information on the cost of gasoline delivered from suppliers.

Human "go-devils," three of 'em, fit with room to spare into a joint of 24-in. pipe now being delivered and laid along the eastern extension of War Emergency Pipelines, Inc.

This Week...

TRANSPORTATION—Railroads increase movement to East Coast, slightly . . . daily average touches above 744,000 bbl. . . . Greater load thrust on overland facilities, by closure of Great Lakes and New York barge canal. . . . Emergency pipe-line link, between Tiffin and Akron, Ohio, rushed into service, to make 15,000 bbl. daily available to eastern lines. . . . ease strain on rails. . . . More crews moved to eastern extension of WEP system, despite inclement weather . . . which will not halt work. . . . I.C.C. rules Champlin Refining Co. gasoline line is common carrier, subject to its jurisdiction. . . . Contracts awarded for 24 coastal tankers; completion in 1943 specified. . . .

REFINING—First alcohol-butadiene plant completion scheduled in January, at Institute, W. Va.; another at Pittsburgh will start operations in 3 months; a third at Louisville, Ky., to be finished in June. . . . Rubber Director Jeffers denies Gary, Ind., butadiene project revived. . . . Operators depressing gasoline to minimum, in some areas; others limited by essential demand which continues upward in most active defense areas. . . . Lion Oil Refining Co. awarded butadiene-plant contract. . . .

INTERNATIONAL—Treaty with Mexico, lasting 3 years, cuts import duty on crude and fuel oils in half, removes all limiting quotas. . . . Tanker shortage and regulated consumption obviate any material change for war's duration. . . . Extension of policy into peacetime could have significant bearing on domestic operations. . . . Concessions on Mexican oil automatically applies to all other favored nations, including Venezuela, Colombia, Peru—all, in fact, except Axis partners. . . .

MATERIALS—Preliminary work with CMP causes equipment manufacturers to feel supply outlook is brightening; experience with allotments, flow of materials into operating channels needed to prove their point. . . . But regulatory machinery is less cumbersome, more understandable, aimed at sound principle of balancing supply of critical metals with requirements, a fundamental in times of shortages previously overlooked. . . . Plan assures delivery of allotments, on schedule. . . . Unavailable supplies will not be allocated; thus, no one can anticipate more than they expect to receive. . . .

PRODUCTION—Drop of 170,225,000 bbl. in world production caused entirely by war. . . . Severest declines in exporting and invaded countries. . . . Near eastern countries, three Latin-American producers score impressive increases; also the result of war. . . . A few other scattered countries, including Canada, increase. . . . January quotas totaling 4,124,000 bbl. daily certified to producing states . . . up 104,000 bbl. from December. . . . Gains confined to Districts 2 and 3 . . . others static. . . . Texas' pledged acceptance of PAW quotas carried through in January allowable. . . . Purchasers had grown resentful of constant excesses. . . . They didn't want to store unneeded oil . . . hesitated to invoke pipe-line proration, because of producer criticism. . . .

MARKETS—Slight reaction from national rationing; gasoline excesses restricted to isolated cases. . . . Most refiners could sell more, if they could make it and move it . . . while, also, meeting fuel-oil demands. . . . Service stations throughout country authorized to institute 3-cent margin, above costs of supplies. . . .

First Experiences With CMP Improve Outlook for Supplies

FIRST experiences with Bills of Materials for petroleum-industry supplies of steel, copper and aluminum which enter a period of transition January 1 to the new Controlled Materials Plan indicate a more concise and satisfactory method of procuring equipment is emerging. Contractors now constructing petroleum war plants, including aviation-gasoline units, synthetic-rubber and toluene plants report that the outlook for receiving supplies on schedule has been enhanced materially by their preliminary experiences with CMP.

There are 10 specific steps in moving from the PRP to CMP, two of which have been taken. The eight remaining stages of transition extend from January 1 to July 1, 1943, after which the CMP becomes the only medium through which supplies of the three critical metals can be obtained by manufacturers. Other critical materials may be incorporated into the CMP at any time by the War Production Board.

The cleaner-cut pattern for obtaining necessary supplies of the three critical metals envisaged by manufacturers naturally filters down through the customers they serve and it is at this stage that oil operators appear likely to benefit from improvements.

The CMP ties together the control of material and the control of schedules through the simple procedure of making raw material allotments through the same channels followed in setting the production schedules. For example, the Army sets the production schedules for the prime contractors for tanks; under CMP the Army will also allot the material to the prime contractor of tanks, who in turn will reallot it to his subcontractors, also setting production schedules for his subcontractors. If it becomes necessary to cut the amount of material available for the production of tanks, the Army will reduce the production schedules of the prime contractor, and at the same time, reduce the amount of the material to be made available. The prime contractor will go through the same steps with his subcontractor.

This process, called vertical allocation, differs from the previous system in that, under PRP, the WPB issued the authorizations to the manufacturers as to the amount of material they were permitted to procure, while the Army, Navy and other agencies issued instructions as to the production schedules to be maintained. It was often not possible to insure coordination, and the manufacturer was faced with a conflict between production schedules and materials which he could not resolve.

Definitions

To understand the new plan, the first step is to add a new set of definitions to the previously learned priority phrases, such as PRP, P orders, etc. The most important of these new definitions are:

1. *Controlled material:* Carbon steel, alloy steel, copper, aluminum and such other materials as may be prescribed from time to time, in each case only in the forms and shapes indicated in the CMP Materials List, or as otherwise ordered by the vice chairman on program determination.

2. *CMP materials:* The materials on the list attached to copies of the plan. The list includes controlled materials and other materials for inclusion in bills of materials and inventory reports.

3. *Controlled Materials Division:* The division of the WPB which is charged with supervision over the production and distribution of any controlled material. References to decisions or actions of a Controlled Materials Division mean decisions or actions by the director of the division.

4. *Claimant agency:* Petroleum Administration for War, ODT, Office of Rubber Director, National Food Administrator, National Housing Agency, Construction and Facilities Committee, War Department, Navy Department, Maritime Commission, Aircraft Scheduling Unit (agent for Army Air Forces and the Navy Bureau of Aeronautics), Office of Lend-Lease Administration, Board of Economic Warfare, Office of Civilian Supply, and such others as may from time to time be designated.

5. *Requirements committee:* The requirements committee of the WPB includes a representative of the State Department and a representative of each of the claimant agencies and passes upon the major divisions of materials for prosecution of the war.

6. *Prime consumer:* Any person who receives an allotment of controlled material from a claimant agency either directly or through an office of such agency.

7. *Secondary consumer:* Any person who receives an allotment of controlled material from a prime consumer or another secondary consumer.

8. *Class A product:* Any product containing any controlled material fabricated beyond the forms and shapes specified in the CMP materials list, except a Class B product.

9. *Class B product:* Any product containing any controlled material fabricated beyond the forms and shapes specified in the CMP materials list, which is contained in the Class B list of the CMP.

Ten Steps in Controlled Materials Plan

1. CMP announced by War Production Board, November 2, 1942.

2. Claimant Agencies complete collection of Bills of Materials and estimate requirements, November and December.

3. Claimant Agencies submit requirements to Controlled Materials Division, WPB, with copy to Requirements Committee, showing materials required, by months, broken down as between (a) production, (b) construction and facilities, and (c) maintenance, repair and operating supplies, January 1.

4. Controlled Materials Division and Office of Vice Chairman analyze requirements submitted by Claimant Agencies and make preliminary reconciliation to the extent possible between requirements and supply, January 1-15, 1943.

5. Claimant Agencies and prime consumers develop information necessary in making final allotments, January 1943.

6. Requirements Committee makes allotment of controlled materials to Claimant Agencies for second quarter of 1943, February 1, 1943.

7. Claimant Agencies distribute allotments to prime consumers, February 1943.

8. Prime consumers divide allotments authorized by Claimant Agencies among secondary consumers and both place authorized orders with suppliers, February and early March 1943.

9. Controlled Materials Division watches placement of orders on mills and mills' shipments and assist in placing orders for consumers of controlled materials who are unable to obtain mill acceptance of authorized orders, March and thereafter.

10. Alternative plans on procedures with reference to controlled materials are abolished and thereafter controlled materials are obtainable only under the CMP, July 1, 1943.

Washington Organization

In addition to an understanding of the terms, another requisite to proper understanding of the new procedure is a mental picture of the Washington organization which is responsible for carrying out CMP. This Washington organization centers around the claimant agencies, who meet together in the requirements committee under the chairmanship of the program vice chairman of the WPB. The chairman makes all decisions after examination of the requirements placed before him by the claimant agencies. These decisions are made in terms of total tonnages of controlled materials which are allotted to the claimant agencies for: (1) Production programs, (2) construction, and (3) maintenance, repair and operating supplies. The allotments are then suballotted through their own internal channels to the prime consumers producing finished items under agreed upon production schedules. For example, the Navy receives an allotment of steel which it divides in such a manner as to obtain the maximum production from all shipyards under its jurisdiction. The Navy may vary the amounts allotted to destroyers, battleships and the like within its own discretion except as the chairman of the requirements committee may make allotments earmarked for particular programs.

Of major interest to the individual manufacturer, however, is not the over-all plan of control or the Washington organization for administering that control, but just what he does to obtain delivery of the controlled—and other—materials.

Class A and B Products

The first question which must be answered by each manufacturer for himself is whether his product or products fall in Class A or B. Some manufacturers will produce both classes of products, but, for purposes of clarity, the procedure for Class A and B products will be examined separately.

Class B is a specifically named list of classes of products. Class A is defined as all other products containing controlled materials. In general, however, Class A products may be thought of

as those products purchased directly and manufactured specifically for the claimant agencies or for their prime contractors or subcontractors. Class B products may be thought of as generators, hardware, electrical appliances, bearings, consumers' goods, and other finished items of the regular civilian economy whether purchased for civilian or military purposes.

If after determining the class into which his products fall, a manufacturer believes they have been improperly designated, any manufacturer of Class B products may apply to WPB for permission to be treated as a maker of Class A products. Likewise, a manufacturer of Class A products may make similar application to be treated as a maker of Class B products.

After the manufacturer has determined the place of his products in the plan, the rest of the job divides itself into three major divisions: (1) The procedure for stating requirements; (2) method for obtaining the allotment; and (3) placing of purchase orders.

Requirements

The requirements figures will be developed by the Claimant Agencies through the accumulation of Bills of Materials data for each class of finished product purchased by that agency. The compiling of these Bills of Materials will fall largely upon the prime consumers under the direction of the Claimant Agency. Detailed instructions will be issued by the several Claimant Agencies concerning the makeup of these Bills of Materials. (There are two kinds—Detail Bills of Materials and Summary Bills of Materials.) In general, however, the Bills of Materials should indicate the gross and net weight (unless specifically exempted by the Claimant Agency) of each of the materials listed in the CMP Materials List, which are required for, and contained in, the complete procurement item. The exceptions to this rule will be (1) Government Furnished Equipment produced by other Prime Consumers; (2) Class B products as defined. Class B products are divided into "Group I" and "Group II." In the Case of Class B—Group I, products, the Bill of Materials should list by name and part number (if available) the quantity or dollar value of each of these items required in the complete procurement items, and should show the time interval required between receipt of Class B items as such and final acceptance or delivery of the procurement item. Class B, Group II products need not be included in the Bills of Materials of of manufacturers who purchase them.

Class B: Requirements for Class B products will be compiled in two steps: (1) Each Claimant Agency will prepare its requirement estimates for Class B, Group I, products in number of units or in dollar value as may be agreed between the agency and the Office of Civilian Supply and submit such requirements to the Office of Civilian Supply; (2) the Office of Civilian Supply, through the appropriate Industry Divisions, will compile bills of materials for determining the quantities of controlled materials needed to produce required volume of finished Class B products, both Group I and Group II. The Industry Divisions of WPB will gather this information from all industries. Specific instructions have been issued to make use of figures already in existence if they will meet the needs of the plan, in order to avoid imposing a completely new statistical burden on industry.

Requirements for maintenance, repair and operating supplies for plants owned and operated by a Claimant Agency will be included in the requirements of that agency and submitted to the requirements committee by the agency. For example, a shipyard owned and operated by the Maritime Commission would receive its maintenance, repair and operating supply requirement through the Maritime Commission based on a statement of requirements made by that agency to the requirements committee. All other requirements for maintenance, repair and operating supplies, however, will be compiled in the same manner in which the requirements for Class B products are compiled.

How to Obtain Allotments

Each Claimant Agency will submit its statement of requirements through the Controlled Materials Divisions for preliminary adjustment and reconciliation. The requirements committee will then examine the adjusted figures and the chairman will make his decision as to the division of the supply of controlled materials not later than the last day of the first month of the quarter preceding the quarter in which the allotment is to be effective, e.g., January 31 for the second quarter. These allotments of controlled materials made to the Claimant Agencies will not exceed the supply as estimated by the Controlled Materials Divisions for each material.

On the basis of the allotments, each Claimant Agency will adjust its production programs to the amount of material available. At the same time applications for allotments will be received from prime consumers using controlled materials who sell Class A products to the agency. Secondary consumers who make Class A products for sale to prime consumers or other secondary consumers will obtain their allotments from their customers. Producers of Class B products will submit their applications to the proper Industry Divisions of WPB. The application forms are a simple statement of the monthly production schedule of and products and the monthly deliveries of the controlled materials required to fill that schedule.

Upon receipt of the applications from Class A producers, each Claimant Agency will authorize a monthly production schedule and allot specific amounts of material for each month to fill that schedule and return the authorization to the applicant. (In order to insure capacity production of Controlled Materials, the Claimant Agency will be allowed to make allotments to prime consumers up to 105 per cent of the allotments received from the requirements committee.)

In the case of Class B products, allotments of controlled materials will be made by the Industry Divisions in such a way as to insure the production of all the Class B products required by the Claimant Agencies unless a fabrication bottleneck prohibits the filling of all demands, in which case the requirements of the agencies for the particular Class B product will be revised to fit fabrication capacity.

Each allotment will bear an Allotment Number which is a coded number (W-1234-567-16) with a letter designating the agency; four digits desig-

(Continued on Page 50)

Federal Order Digest

WPB Priority Orders

MACHINE TOOLS—E-1-b: Requires, after December 25, that orders must be accompanied by photostatic or certified copy of preference rating certificate under which buyer obtained rating, effective December 25, 1942.

PRIORITY REGULATIONS — Amended PR-17: Provides for inclusion of orders for military exchanges or service departments as "defense orders," effective December 17.

DRUM COATINGS — M-158: Entire order revoked, effective December 17.

WPB Limitation Orders

ELECTRICAL CONDUIT—L-225: Restricts sales and limits use of steel in conduits, electrical metallic tubing and raceways; prohibits sales and deliveries except pursuant to PR A-1-j or better, effective December 19.

CAMERA FILM—L-233: Restricts film for amateur camera enthusiasts to 50 per cent of 1941 output; cuts supply for professionals 24 per cent, effective December 16.

CONTROL INSTRUMENTS—L-234: Empowers director general to direct production and deliveries of thermometers, pressure gages, control valves and other industrial instruments, effective December 24.

General Administrative

SELECTIVE SERVICE — Employers and soldiers themselvers must initiate action to obtain honorable discharges from the Army of men over 38, to return to essential jobs in war industries. (See War Department Circular 397.)

FLUORSPAR—WPB Steel Division, Fluorspar Section, institutes voluntary conservation program to lower consumption by 10 to 15 per cent in steel production. Material important in making 100-octane gasoline.

OPA Price Orders

USED STEEL DRUMS AND PAILS — Revised PS-43, Amendment 1: Establishes maximum price of $35 each for reconditioned 55-gal. stainless-steel drums which manufacturers can no longer use because of war regulations, effective December 19.

FUEL—RPS 88, Amendment 50: Advances maximum price of motor fuel in Puerto Rico 3 cents per gallon above previous ceiling, effective December 1.

FUEL—MPR 137, Amendment 13: Authorizes Puerto Rico retailers to advance gasoline prices 3 cents per gallon, effective December 1.

Personnel Changes

APPOINTMENTS: Eric L. Kohler, appointed executive officer of Petroleum Administration for War; William C. Glynn, recently retired as assistant freight traffic manager of the Pennsylvania Railroad Co., made chief of the transportation section, WPB Containers Division; James Clay Woodson, former vice president and general manager of the Lee Wilson Engineering Co., made "industry advocate" with WPB, will examine questionnaire forms sent industry, balance the need for the requested data against the burden imposed upon business; Walter J. Derenberg, becomes chief of research and opinion branch of the court review, Research and Opinion Division, OPA; William J. Logan, formerly vice president Central Hanover Bank & Trust Co., made director of WPB's Compliance Division; William Francis Gibbs, made controller of shipbuilding, to coordinate effort between WPB, the Navy, the Army and the Maritime Commission, controlling general policies.

RESIGNATIONS: Arthur V. Wiebel, executive consultant to the Steel Division, has returned to his position as assistant vice president of U. S. Steel Corp.

STATE CAPITALS...

TEXAS

BASIC PRODUCING period for January will be 20 days instead of the 22 allowed during December, the January allowable order of the Texas Railroad Commission reveals. Over 100 fields will be exempted from shutdowns including Heyser, Rincon and Yates, which produce war-materials crude. These three fields will operate 27 days.

The Panhandle will operate 24 days, a drop of two while the Worsham-Steed field in Jack County was raised from 22 to 27 days. Some West Texas fields received a sharp cut but the Emperor and Slaughter pools were given two extra days over the basic allotment. Johnson and Sand Hills (Permian) will get 19 days, Abell will get 18 days, North Cowden, Emma, Foster, Fuhrman, Harper, Sand Hills (Ordovician) and Shipley get 17 days and Abel (Permian) North Cowden (deep) and Sharon Ridge get 15 days.

The January allowable of 1,426,842 bbl. daily, including 119,290 bbl. of natural gasoline, distillate and condensate, was provided for in last week's order.

THE FOLLOWING hearings will be held early next month:

January 7: East Texas Salt Water Disposal Co. to drill a disposal well on the Asa King tract, Chism Survey, Gregg County; Perkins Prothro Co. for an exemption from commission order as it affects its 1 Bashara in Young County.

January 8: Midway-Victory Oil Co. to drill a salt-water disposal well on the Floerke lease, Midway pool, San Patricio County; Humble Oil & Refining Co. to convert its No. 1-B Quinn in Amelia pool, Jefferson County, to a disposal well.

January 9: Magnolia Petroleum Co. to drill disposal well on the Clara Sevier lease in the Robert Russell Survey, Clara Driscoll pool, Nueces County.

January 11: British-American Oil Producing Co. to convert its 1-C T. B. Wilson, Mankins shallow pool, Archer County to a disposal well; La Gloria Corp. to dually complete 1 Grogan-Cochran, Azariah Prather Survey, Montgomery County.

A LAW AUTHORIZING Texas' participation in the Interstate Compact Commission will be asked of the legislature when it convenes in January, E. O. Thompson, member of the Railroad Commission, announced last week. The act sought will permit the state to belong to the compact for 4 years instead of the 2-year term previously sanctioned.

FIVE COMPANIES received Christmas presents from the Railroad Commission when that body December 23 issued the first permits for the transfer of allowables in the East Texas field where operators could not get pumping equipment for wells. Hearings in the matter were held earlier in the month. The permits make it possible for the companies to produce the per-well allowable from other wells.

The order resulted from the federal Government restriction on use of pumping equipment on wells on less than 10-acre spacing and it allows the companies after a hearing to transfer the allowable to other wells. Hearings on requests for exception to Rule 23 have been numerous.

Many Details of Texas' Oil and Gas Conservation Center on Baumel

MUCH OF THE DETAIL of the Texas oil and gas conservation policies comes under the supervision of J. K. (Jack) Baumel, director of production for the oil and gas division, Railroad Commission. Reservoir control and increased recoveries from oil pools are his main interests. He has done extensive work on phase equilibria in distillate horizons.

JACK BAUMEL

He graduated from the University of Texas in 1936 as a chemical and petroleum engineer and went directly to the Railroad Commission staff as a junior engineer. Later he became senior engineer and, in 1941, was promoted to the post of chief enforcement officer in charge of oil and gas conservation. He was made director of production on August 1, 1942.

Reading and study of technical papers dealing with control of fluid movement in oil reservoirs occupies most of his hours for relaxation. The youngest of two children was born in December.

THE TEXAS SUPREME COURT recently refused a writ of error in Humble Oil & Refining Co. vs. Texas in a vacancy suit. The judgment gives the state title to approximately 145 acres of oil land in the East Texas field together with $401,000 cash plus 6 per cent interest since July 21, 1939. Recovery to the state is subjected to its leases previously granted to Bryant and Groneman.

ANNOUNCEMENT last week by the East Texas office of the Railroad Commission indicated the world's largest oil pool was completing the quietest year in its history. Completions during the first 10 months of 1942 totaled only 7 wells as against 432 for the same period in 1941. Pluggings and abandonments also fell off sharply from 468 to 282 in the comparative periods.

NEW MEXICO

INCREASED ALLOWABLE production as a bonus for deeper drilling and wildcat exploration was suggested by a committee of New Mexico oil men as a stimulant to prospecting in a report made last week to Gov. John E. Miles. The committee was appointed last month by the governor at the state-wide meeting.

Governor Miles had previously pointed to the seriousness of the situation due to the state's production having exceeded the new oil discoveries for the last 3 years.

In its report the committee of oil men said pegged prices are the primary cause of unsatisfactory exploration efforts and added that the industry cannot be expected to produce oil for a dollar a barrel when it costs $2 to do the job.

Machinery Set Up to Study Critical-Material Savings

WASHINGTON, D. C.—More efficient operating practices and adequate substitutes for critical materials will be sought by oil producers through a series of studies to be made by the production committee of the Petroleum Industry War Council, Petroleum Administrator Harld L. Ickes announced last week.

The studies will be conducted as follows:

The committee on production will select one or more subjects that deal either with substitutions or operating practices. Subjects may be suggested by members of the committee, the Petroleum Administration, district production committee, or individual operators. Decision as to what studies will be made, however, remains with the committee on production.

When a subject is selected, the production committee will appoint a five-man study group consisting of four industry representatives who are specialists in the subject and one representative from PAW. The latter will also act as liaison between the study group and PAW.

E. L. Kohler Becomes Executive Officer on Oil Agency Staff

WASHINGTON, D. C.—Appointment of Eric L. Kohler as executive officer of the Petroleum Administration for War was announced last week.

Mr. Kohler will serve as executive assistant to Deputy Administrator Ralph K. Davies in the handling of organizational and administrative problems within PAW.

Mr. Kohler went to PAW from the War Production Board's office of operations, where he was engaged in organizational and administrative work. From 1938 to 1941 he was comptroller of the Tennessee Valley Authority at Knoxville, Tenn., having entered governmental service after 20 years' experience as a consulting accountant in Chicago.

Contracts Awarded for 24 New Coastal Oil Tankers

WASHINGTON, D. C.—Contracts for the construction of 12 coastal tankers each have been awarded to the Marine Maintenance Corp., Bayonne, N. J., and Gray's Iron Works, Inc., Galveston, Tex., the Maritime Commission announced last week.

The awards were made in keeping with the commission's program calling for the construction of 24 additional coastal tankers. Both companies are now constructing this type of vessel for the commission.

According to the contract, the tankers, which are 220 ft. long and 1,600 deadweight tons, must be delivered into service by the end of 1943, each yard delivering its first vessel in June 1943.

Lubricating-Oil Plant in Hungary Under Consideration

The Pet Nitrogen Superphosphate Works A. C. is planning to establish a lubricating-oil refinery in Hungary at a cost of 6,000,000 pengos (about $1,169,400 at the official rate of exchange), according to the German press.

Domestic mineral oils are to be processed, and it is believed the refinery can supply a considerable part of the Hungarian lubricating-oil market.

the OIL AND GAS JOURNAL

PRODUCING REFINING NATURAL GASOLINE PIPE LINE

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An Oil War

After 3 years and 4 months of a world conflict, petroleum stands out as never before as an essential war commodity—its availability in the form of many products the greatest source of United Nations' strength, its lack the greatest weakness of the Axis.

Despite the seizure of Rumania's petroleum and the other oil supplies in the areas which it has invaded, plus a substantial production of substitutes, Germany found it necessary this year to strike for the Caspian Sea production of the U. S. S. R. It has failed in the main objective and now is faced with a situation in which it lacks the oil needed to maintain offensive military actions and a minimum supporting economy within its own boundaries and within the countries it now controls.

When the history of this war is written there is every reason to believe that it will reveal that Germany failed to duplicate the early-war successes in 1941 and this year on the Russian front and elsewhere because its military and war-production machine lacked the required lubrication and motor power. Its chances of acquiring more supplies through further aggression dwindle daily.

Japan revealed careful planning and genius for war when it quickly invaded the East Indies and Burma, the only important oil areas in that part of the world. If permitted to hold these oil areas over a long period the rehabilitation of fields and plants will mean that Japan will be able to supplement its own small output and storage acquired before the war started. The recapture of the Southwest Pacific by the Allies will force the Nipponese shortly to fight a defensive war within the confines of their own islands with oil products representing a small fraction of their war requirements.

It is not necessary to look only at the activities of the Axis Powers in their own areas to be impressed with the part that oil is playing in this war. The enemy threatened for a time to bring serious confusion to our participation in the war through successful submarine raids on wartime tanker transportation. The reports in this Inter-American number show what these widely scattered and effective attacks on shipping have done to oil production and transportation outside this country.

So long as Axis boats, powered with petroleum products, roam the seas, they will greatly increase the difficulties of the United Nations on the war fronts and add to the problems incidental to the maintenance of the all-important supporting economy at home.

Present plans call for the expansion of existing and new offensives against the Axis. This will necessitate the combined support of the oil resources of the United Nations extending from the northern parts of Canada and the isolated areas of South America to the Middle East operations of the Eastern Hemisphere which are still subject to possible destruction or acquisition through enemy action.

Continued cooperation in fields, plants and transportation everywhere will speed victory which will mean that oil operations can resume the widespread expansion assured with the return of peace. Given the materials operators in all areas will continue to give the military the oil power and fuels on land and sea and in the air, that it has to have.

the OIL AND GAS JOURNAL

NEXT WEEK

With next week's issue the Journal will appear in its new standard size, and in a completely new typographic dress. Here is a small-scale reproduction of the front cover in the new format.

JANUARY 7, 1943

First Experiences With CMP Improve Outlook for Supplies

(Continued from Page 47)

nating the program (the total output of the item); three digits designating the schedule (for individual producer's output); and the final two digits designating the month in which the allotment applies. These months are numbered starting with January 1942 as (01), April 1943 as (16) January 1944 as (25), and so on.

In addition to the allotment number, a preference rating is assigned with the allotment. This preference rating is used to indicate the relative urgency in connection with the purchase of fabricated parts as discussed later, and in case of conflicts of schedules.

Upon receipt of an allotment, the prime consumer will immediately subdivide the allotment of controlled materials between himself and his immediate secondary consumers in such a way as to insure materials to meet the authorized production schedule.

It should be noted at this point, when the plan is fully in effect (i.e., after June 30, 1943), no orders may be placed for controlled materials until an allotment number has been received, with certain minor exceptions, such as small orders from warehouses.

To facilitate the forward placing of orders, the claimant agencies are permitted to allot for quarters in advance of the quarter for which an allotment has been received. These forward commitments are limited to 80 per cent of the most recent quarterly allotment for the first succeeding quarter, 60 per cent for the second succeeding quarter, and 40 per cent for the third and subsequent quarters. A claimant agency may allot any particular program 100 per cent of its requirements for the future quarters just so the total committed by the agency are within the 80-60-40 ratio. For example, the Navy might approve allotments for 100 per cent of the carrier program for three-quarters in advance if this did not mean a commitment in the third advance quarter of more than 40 per cent of the Navy's most recent quarterly allotment for all programs.

Placing Orders

A consumer holding an allotment number is permitted to place his purchase order with any supplier except as may be otherwise specifically directed. In such case, the consumer will be notified that his order is to be placed with the particular supplier concerned. Provision is made, however, that orders must be placed in time to comply with necessary production cycles as determined by the Controlled Materials Divisions.

To avoid piling up of orders, a mill acting under a production directive—which specifies the quantities, forms and shapes of materials to be produced during a stated period of time—cannot accept orders totaling more than 110 per cent of such production directive. Mills or suppliers not acting under production directives are limited in accepting orders to 105 per cent of their expected production capacity. Each supplier is required to notify the Controlled Materials Division concerned when these limits are reached. If, in spite of these provisions, a consumer holding an allotment number cannot find a supplier to fill his order, he should immediately notify the Controlled Materials Division concerned and arrangements will be made to find a supplier who can fill the order.

It is provided that all orders bearing allotment numbers are to be filled during the month designated if possible, and in no case may an order be postponed later than the last day of the following month. If a mill finds itself unable to fill its orders within the designated period, it must notify the Controlled Materials Division.

In the case of steel (except castings), when an order is placed directly with a mill, a form must accompany the purchase order, showing tonnages, month of shipment, and allotment number of steel products. The steel mill will indicate its acceptance or rejection of the order on this form and will send one copy of it to the Steel Division of WPB. Through this procedure, any maldistribution between the mills will be quickly caught and corrected. Also the division will have an accurate basis for issuing production directives to the mills. Similar provisions may be called for in the case of copper and aluminum.

After June 30, 1943, no preference ratings will have any effect on deliveries by producers of controlled materials. All orders for such deliveries must be accompanied by allotment numbers. Until then, orders bearing allotment numbers will take precedence over all rated orders but, to the extent that orders bearing allotment numbers do not take up the capacity of a mill, other orders may be filled according to preference ratings or applicable priorities regulations or orders.

In the case of fabricated products containing controlled materials, orders accompanied by allotment numbers will generally take precedence over all other orders, except those bearing a rating of AAA. Producers are not to accept orders bearing allotment numbers for fabricated products unless they can be filled on schedule. If fabricating bottlenecks develop, however, preference ratings will generally determine the sequence of delivery as between such orders.

Construction

Procedures to be followed in connection with the allotment for construction are similar to those followed for manufactured products. Each claimant agency will submit its requirements for construction of all facilities to be used exclusively for that agency. The allotments will be made through the agency in the same manner as outlined above for manufactured products with the person responsible for the construction considered as the prime consumer and all other users of material in connection with the construction projects as secondary consumers.

Inventory Control

To control inventories, provision is made that each prime and secondary consumer of controlled materials whose inventory of CMP materials is in excess of such limits as may be specified will submit an inventory following the close of each quarter. These reports will be made available to the Controlled Materials Divisions and the Material Redistribution Division of the War Production Board, and steps will be taken to reduce the inventory of each consumer where an excess is indicated.

Transition

Speed is necessary in gathering together the facts so that the plan can gear the new war schedules to the material supplies position at the very earliest date. The current schedule calls for a statement of requirements from the claimant agencies to the controlled materials branches by January 1, 1943, and a decision from the requirements committee as to the second quarter allotments by February 1, 1943. This will mean that the plan will be partially operative in the second quarter of 1943. However, provision is made for the transition by keeping in effect of all the present controls including PRP until the new plan is fully operative on July 1.

During the first quarter of 1943, CMP will have effect on the PRP procedure. During the second quarter, however, some producers operating under PRP will have received allotments under CMP. Such manufacturers will proceed to extend their allotments in the manner provided by CMP, deducting the total from their total authorizations under the PRP. Thus, if the manufacturer receives an authorization to purchase 1,000 tons of steel under PRP and has received CMP allotments for 400 tons, he will extend the CMP allotment number for 400 tons and place orders for the remaining 600 tons under the preference rating provided by his PD-25A certificate.

Reduction in Oil Production Is Caused Entirely By Warfare

(Continued from Page 43)

that supplies for the United Kingdom might be taken from the Palestinian refinery which processes Iraq crude. It is entirely probable also that the bulk of those oil products which North African civilian and military operations require and which can be supplied from Haifa will be taken through the Mediterranean instead of via the infinitely longer trans-Atlantic route.

Trinidad, Argentina and Peru registered the largest gains in the Western Hemisphere producing countries. New refining facilities constructed since the war began provided increased outlet for Trinidad crude oil. Argentina, where production has increased steadily over the past 30 years with the exception of the depression periods, again rose. Argentina is South America's principal consuming country and despite the steady increase in production has yet been unable to bring it up to the level of internal requirements. Other Latin-American countries, with little or no production, were in a worse position than Argentina and consumption curtailment was undertaken in many of them. Argentina was offered more oil-field equipment if she would assist her less fortunate neighbors but had not signified acceptance by mid-December.

Peru, the largest source of oil on the west coast of South America, benefited from Argentina's hesitancy. Peru's crude went to numerous countries cut off from other sources of supply. Canada also showed a small increase in production, some of the increase coming from the Northwest Territories where Fort Norman field operations were stepped up to supply the new refinery at Whitehorse.

Besides Venezuala and Colombia, other declines in the Western Hemisphere occurred in the United States and Mexico. Both were attributable to lack of tankers. In the case of this country lack of tankers prevented the filling of demands of its greatest consuming area, the Northeast. Mexico's production fluctuated widely during the year, from below 75,000 bbl. to above 100,000 bbl. daily as the availability of tankers varied. Mexico is expected to receive assistance from this country in the development and modernization of her oil industry as the result of a survey of her needs by a United States commission. Bolivia has already received equipment purchased here during the year with funds provided by the United States Import-Export Bank, and has undertaken a development program.

The decline in world production this year was a temporary development. It is possible that even before the war is over, production will have risen to pre-1942 levels. This is dependent on the size of the war requirements and our ability to supply them. The decline is tanker losses and the increase in construction of tankers and convoy ships indicate that this ability is improving.

It Takes a Beach-Head to Start an Invasion

This welded steel amphibian tractor is the Marines' answer to tough "competition" that beat us to the offensive, then dug in.

ALTER EGO: Those few Marines may not win the war by themselves, but they will establish a beach-head and that's a mighty vital prelude to dislodging Axis "competition".

Yes, war is like that. Business now is somewhat like that. Business after the war will be just like that!

ALTER EGO: Right. To win the Battle for Business after this war we're going to have to get on the offensive with welded steel products.

Right. But first we must establish our beach-heads of welding knowledge. Let's start this prelude to invasion of the post-war market NOW.

Ask your inner self if a "beach-head" of welding knowledge shouldn't precede post-war market invasion.

THE LINCOLN ELECTRIC COMPANY
CLEVELAND, OHIO

then I said to myself—

MARINES and WELDING
—the situation will be well in hand

Industry's War Assignments Met Completely, Boyd Avers

By WILLIAM R. BOYD, JR.
President, American Petroleum Institute,
Chairman, Petroleum Industry War Council

MOTORISTS are getting only part of the gasoline they would normally use, home-owners with oil burners are on short rations, apartment houses and factories have had to convert from oil to coal—but "not one ship or plane or tank has failed to move on schedule for lack of petroleum products."

That is the job we set out to do, and so far the industry and the Petroleum Administrator, working together in what has become the most unique and what we think is the most effective industry government team in Washington, have delivered the goods for the armed forces, where and when, and in the quantities, needed. Brig. Gen. W. B. Pyron of the War Department is authority for the statement quoted.

Transportation, and men, materials, and money, were the oil industry's basic problems last year, and there is no question but that they will become more critical long before they are entirely solved.

The East Coast has become the front porch of Africa and Europe, and large quantities of the petroleum which we have brought with so much sweat from the Southwest to the East have rested there only momentarily before taking off in Army and Navy tank ships for the other side of the Atlantic.

The result, in decreased civilian rations, has been headline news the past month. The oil industry and the Petroleum Administrator have not yet given up hope, however, that further miracles will be brought to pass in tank-car deliveries, to better the splendid job that already is being done, so that those who must have gasoline will get it, and those who cannot convert and must heat with oil will have enough to keep warm.

Materials and manpower shortages have been plaguing every operating branch of the industry and steadily are growing more acute. The oil industry recognizes fully that it is entitled to no more materials than are absolutely essential to perform the job the nation expects of it, but in some instances we have felt that there has been a failure to understand these minimum needs.

Daily we are losing skilled drillers, production men, and refinery experts into whose skill has gone years of training. The manpower problem is one of the most serious now confronting the industry, and some solution must be found without delay.

Specifically earmarked price increases have offset some of our increased costs because of transportation changes, but the refining branch of the industry particularly is incurring unique war costs that must be recognized soon by the Government. The burden of manufacturing more lower priced and less higher priced products in a frozen economy is attacking the solvency of many of the smaller units of the industry, and actually is threatening their ability to produce.

New oil reserves are needed at once, and studies of the Petroleum Industry War Council and others are being made now to determine what incentives ought to be granted to encourage new discoveries of oil.

Crude-oil production, estimated at about 1,385,000,000 bbl. for the year, was slightly under the all-time record of 1,404,000,000 bbl. in 1941, and the approximately 20,000-well completions this year are only 60 per cent of the 1941 total. Stocks of crude oil at the end of the year reached the lowest point in 20 years.

For 1943, if we can produce it and transport the products, there should be a substantial increase in crude-oil production. To meet even the rationed demand would require a rise of more than 400,000 bbl. a day by the end of the year, compared with the same period of 1942.

Total production of motor fuel, kerosene, and lubricants dropped from the 1941 records, but the output of light and heavy fuel oils reached new all-time highs. Inventories of all major products except lubricants declined to levels substantially below the 1941 year-end stocks.

Indicative of the low level of petroleum prices is the fact that the Bureau of Labor Statistics' index of wholesale prices for petroleum products rose only from 52.2 in 1939 to 59.8 this year, while for all commodities the index jumped from 77.1 to 98.8.

PRODUCTION AND STOCKS OF PRINCIPAL PETROLEUM PRODUCTS
(Barrels)

Product—	Production 1942	Production 1941
Motor fuel	614,350,000	690,958,000
Kerosene	65,900,000	72,586,000
Gas oil and distillate fuel oil	215,200,000	189,177,000
Residual fuel oil	355,400,000	342,367,000
Lubricants	38,500,000	39,539,000

Product—	Stocks, Dec. 31 1942	Stocks, Dec. 31 1941
Motor fuel	87,000,000	98,119,000
Kerosene	*10,000,000	*14,515,000
Gas oil and distillate fuel oil	45,000,000	49,330,000
Residual fuel oil	70,000,000	93,138,000
Lubricants	10,000,000	8,127,000

*Includes terminal stocks.

INDEX OF WHOLESALE PRICES
(Bureau of Labor Statistics)
(1926 = 100)

Year—	Petroleum products	All commodities
1933	41.0	65.9
1934	50.5	74.9
1935	51.3	80.0
1936	57.3	80.8
1937	60.5	86.3
1938	55.9	78.6
1939	52.2	77.1
1940	50.0	78.6
1941	56.9	87.3
1942	59.8	98.8

WELLS COMPLETED IN THE UNITED STATES

Year—	Oil wells	Gas wells	Dry holes	Water-drive wells	Total
1938	18,598	2,066	6,141	688	27,493
1939	17,625	2,198	6,474	1,420	27,717
1940	19,125	2,352	6,617	1,947	30,041
1941	19,552	3,007	7,128	2,366	32,053
1942	10,450	2,250	5,500	1,800	20,000

CRUDE-OIL PRODUCTION
(In thousands of barrels)

State—	1940	1941	1942
Arkansas	25,775	26,327	26,664
California	223,881	230,263	247,775
Colorado	1,626	1,875	2,267
Illinois	147,647	134,138	106,454
Indiana	4,978	6,634	6,758
Kansas	66,139	83,261	97,647
Kentucky	5,188	4,762	4,200
Louisiana	103,584	115,908	116,878
Michigan	19,753	16,361	21,753
Mississippi	4,400	15,314	28,846
Montana	6,728	7,826	8,077
Nebraska	(*)	1,636	1,286
New Mexico	39,129	39,369	31,931
New York	4,999	5,185	5,410
Ohio	3,159	3,340	3,575
Oklahoma	156,164	154,759	140,106
Pennsylvania	17,353	16,750	17,940
Texas	493,209	507,584	481,581
West Virginia	3,444	3,433	3,575
Wyoming	25,711	29,694	31,794
Other states†	347	63	65
United States total	1,353,214	1,404,182	1,384,582

*Included in Other States in 1940.

†Missouri, Tennessee, and Utah in 1941 and 1942; these states and Nebraska in 1940.

PAW District 2 Offices Moved To Blum Building in Chicago

WASHINGTON, D. C.—Opening of district branch offices in Tulsa and Pittsburgh, Pa., and removal of the Chicago District 2 office to a new address was announced last week. New address of the District 2 office is Room 1200 Blum Building, 624 South Michigan Avenue, Chicago. The telephone number is Wabash 9040. Wirt Franklin is district director in charge.

S. R. CLINKSCALES

To expedite the work of the district offices, branches have been established both in District 1 (East Coast) and in District 2. The branch office of District 2 is in Room 410, Beacon Building, Tulsa; the telephone number is 4-9181. Stationed there are C. C. Brown, of the Production Division; Mark S. Patton, of the Natural Gas and Natural Gasoline Division; and Silas R. Clinkscales, of the Materials Division.

The branch office of District 1 is in Room 700 Benedum-Trees Building, 221 Fourth Avenue, Pittsburgh, Pa. The telephone numbers are Atlantic 0862, 0863, and 0864. Stationed there are Virgil Bowyer, of the Natural Gas and Natural Gasoline Division, and Henry W. Fuelhart, of the Production Division.

Other division representatives will be stationed at the branch offices as soon as transfer of personnel can be arranged.

New Butadiene Unit Will Be Constructed by Lion Oil Refining Co.

Lion Oil Refining Co., El Dorado, Ark., will build a butadiene plant in connection with its normal refining facilities. Rubber Reserve Co., subsidiary of Reconstruction Finance Corp., will finance the construction, and will take the output of the unit for use in manufacture of synthetic rubber. Construction work is to start at once.

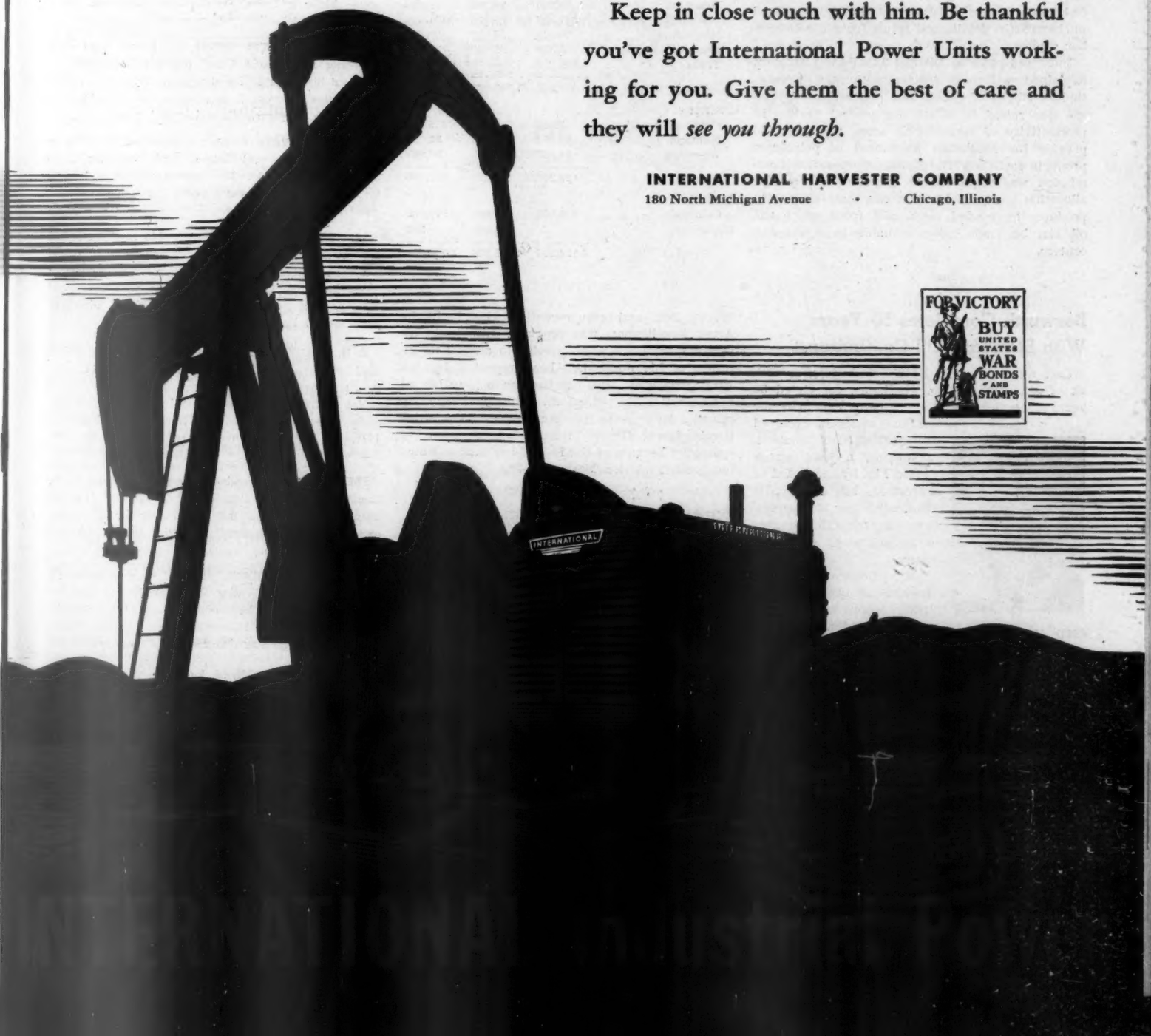
Keep Them Pumping! Keep Them Serviced! Make Them Last!

THERE IS one man who is making it *his* business to help *your* business in this critical time. He is the International Industrial Power dealer. He knows International Power Units inside out. He can help you *keep them pumping, keep them serviced, make them last.*

The International Industrial Power dealer's service operations have been broadened to meet wartime needs. His shop is well equipped. His mechanics and servicemen are handling a new volume of service business with a "know-how" keyed to the war. His stocks of Genuine IHC Parts are in A-1 shape.

Keep in close touch with him. Be thankful you've got International Power Units working for you. Give them the best of care and they will *see you through.*

INTERNATIONAL HARVESTER COMPANY
180 North Michigan Avenue • Chicago, Illinois



Districts 2 and 3 Receive Only January Production Advances

INCREASES of 104,400 bbl. in District 3 and 3,900 bbl. in District 2, certified last week for January producing operations by the Petroleum Administrator for War, lifted the nation's authorized output of crude oil and light petroleum liquids to a daily average of 4,124,200 bbl.

Texas, assigned a January production quota of 1,426,800 bbl. daily, received a bulk of the increase, up 76,400 bbl. from the December authorized output. The increase, however, is insignificant because Texas had not strictly observed the PAW quota in its December allowable order. Louisiana's quota was raised 21,400 bbl., New Mexico's went up 5,600 and Arkansas was authorized to produce 1,000 bbl. more in January than in December.

The only significant changes in District 2 which received a net increase of 3,900 bbl., were a quota advance of 9,300 bbl. daily in Kansas and reductions of 1,500 bbl. in Illinois and of 3,300 bbl. in Oklahoma. Quotas in Districts 1, 4 and 5 remained unchanged in details and totals from the December figures.

Increased rates in District 3, a PAW statement explained, will meet demand without any reduction in stocks of crude. The production of Kansas was raised to offset the general decline in productivity of surrounding areas and, thus, to provide for maximum movement of petroleum products eastward. The Kansas Corporation Commission was requested to distribute the state's allocation to the fields that can most efficiently produce the needed quota and from which the oil can be made fully available to consuming centers.

RECOMMENDED PRODUCTION RATES
(Barrels per day)

	Total petroleum liquids		Actual prod.
	Jan. 1943	Dec. 1942	Jan. 1942
District 1:			
New York	15,400	15,400	14,600
Pennsylvania	50,700	50,700	49,800
West Virginia	17,000	17,000	16,800
Total	83,100	83,100	81,200
District 2:			
Illinois	272,600	274,100	379,500
Indiana	17,200	17,700	20,000
Kansas	310,000	300,700	252,700
Kentucky	14,200	14,200	12,000
Michigan	63,700	63,800	52,400
Nebraska	3,400	3,400	3,700
Ohio	10,300	10,300	9,600
Oklahoma	400,600	403,900	437,300
Total	1,092,000	1,088,100	1,167,200
District 3:			
Arkansas	78,300	77,300	74,800
Louisiana	347,500	326,100	371,600
Mississippi	50,000	50,000	80,300
New Mexico	105,300	99,700	121,700
Texas	1,426,800	1,350,400	1,698,700
Total	2,007,900	1,903,500	2,347,100
District 4:			
Colorado	7,000	7,000	6,300
Montana	24,700	24,700	22,300
Wyoming	94,500	94,500	83,800
Total	126,200	126,200	112,400
District 5:			
California	815,000	815,000	670,900
Other	.....	.....	200
Total U. S.	4,124,200	4,015,900	4,379,000

Bosworth Completes 50 Years With Standard Oil Co. (Indiana)

Last week, Fred H. Bosworth, buying specialist of Standard Oil Co. (Indiana), completed 50 years of service with the company, and in honor of the occasion, received from Edward G. Seubert, president, a gold watch voted him by the board of directors. Mr. Seubert is the only other 50-year veteran in the Chicago general office of the company.

FRED H. BOSWORTH

Mr. Bosworth started service as office boy in 1892, when he was 14 years old. After 5 months, he was promoted to clerk, and later advanced to stationery buyer and chief clerk. In 1917 he became assistant purchasing agent, and in 1920 purchasing agent. He assumed his present position as a buyer in 1923.

Among the purchases Mr. Bosworth makes are the laboratory equipment and chemicals used by the company's research chemists.

Mr. Bosworth has three sons and one daughter.

John W. Herbert Reported Missing in Pacific Action

FORT WORTH, Tex.—John W. Herbert, head of the Falcon Co. and the Herbert Oil Corp., Fort Worth, Tex., and more recently a captain in the Army Intelligence, was reported missing in action in New Guinea last week. No official notification of his death has been reported by the Army. His wife, who has been managing his oil business since he joined the Army last May, received a letter from the commander of the Third Bombardment Group in New Guinea extending sympathy because of the loss of her husband during combat mission November 24.

Barge and Tug Program Given Approval by Federal Agencies

WASHINGTON, D. C.—A barge and tug-building program which, when the vessels are completed late next year, is expected to bring 100,000 bbl. of oil a day to the East Coast, has been approved by the Maritime Commission, War Production Board, Office of Defense Transportation, and other interested government agencies. The program was recommended more than a year ago, but not approved until last week.

Although the effect of the new plan will not be felt until late next year, it was said that the flow of oil from Texas to the East Coast already is being slightly increased by a barge conversion plan which was a subsidiary feature of the program, and was approved some time ago.

The program involves the building of 100 seagoing tugs to operate along the eastern seaboard, and 500 wooden oil barges for use in intercoastal waters, as well as 21 towboats powered with triple-expansion steam engines, 200 wooden merchandise barges, and 200 dry-bulk cargo barges for use on the Mississippi. The seagoing tugs will be powered by 200-hp. diesel engines.

Under the modified program just approved, 50,000 bbl. of oil will go from Texas ports to Panama City, Fla., daily, and will move by tank car and pipe line from there, about half to Jacksonville and half to Norfolk. The oil going to Jacksonville will be shipped north via the inland waterways. Another 50,000 bbl. of oil will be shipped daily by river from Port Arthur, Tex., to Cairo, Ill., and from there east by tank car.

DEATHS

R. KEITH MILLER, with the land department of Shell Oil Co., Inc., in Centralia, Ill., died suddenly last week, following a heart attack. Mr. Miller formerly lived in Tulsa, leaving for Illinois 5 years ago. He is survived by his widow.

ERVIN GIBSON LEWIS, 68, independent operator of Tulsa, died Monday of a cerebral hemorrhage. He had made his home in Tulsa for 31 years. His oil interests were chiefly in Texas, Kansas and Oklahoma. He is survived by his widow, two sons and a daughter.

THOMAS FRANCIS GREEN, 67, former land commissioner for Humble Oil & Refining Co., died last week at his home in Houston, Tex. Mr. Green retired from active business 2 years ago. He had lived in Houston for 25 years. His widow and a son survive.

GERALD O. TATE, division manager of Smith Meter Co. in Oklahoma and Kansas, died December 20 in Oklahoma City, Okla. Mr. Tate was formerly located in Tulsa, but for the past 2 years had made his headquarters in Wichita, Kans.

JAMES P. JOHNSON, 64, who in 1940 was honored at the International Petroleum Exposition as the "grand old man of the petroleum industry," died December 25 at his home in Bradford, Pa. He was associated with Kendall Refining Co. He had been identified with the oil business since 1895.

E. H. BRADY, 73, independent oil operator of Tulsa, died last Saturday at his home. He had lived in Tulsa for 31 years. As a young man Mr. Brady operated in his native State of Pennsylvania, and in West Virginia, Ohio and Illinois. He came to Oklahoma in 1911, and first drilled near Jenks. Surviving in addition to his widow are two daughters and a son.

FRED H. TAPP, oil producer, died at an Olean, N. Y., hospital last week following a brief illness. He had been associated with the oil industry for 37 years, and operated in the Bradford fields. His widow and a daughter survive.

WILFORD H. McKINZIE, 58, died of a heart attack in Fort Worth, Tex. He was an independent oil operator until recently when he went to work at the Marine Air Station at Eagle Mountain Lake near Fort Worth. He is survived by four daughters and three sons.

JACK M. GUITERMAN, 35, former scout and assistant land man with Texas Co. at Midland, Tex., and more recently a private in the U. S. Army Air Force, was killed when the bomber in which he was a crew member crashed as it attempted to take off from an air field in Liberia. He was inducted into the Air Force in May 1942.

FREDERICK CHRISTIAN AUDIVERT, 78, veteran pipe liner who served with the old Prairie Pipe Line Co. at Bartlesville, Okla., Beaumont, Tex., and later with Magnolia Pipe Line Co., at Beaumont, died December 25 at his home in Chanute, Kans. Mr. Audivert had retired from active service about 10 years ago.

Natural Gas News

Keuka Company Acquired by New York State Natural Gas

WASHINGTON, D. C.—The Federal Power Commission last week authorized the New York State Natural Gas Corp. to acquire and operate the facilities of Keuka Construction Corp. in Auburn, Cayuga County, New York. The Keuka company, which has its principal offices in Pittsburgh, Pa., supplies gas at wholesale to the New York State Electric & Gas Corp. Application for the authorization was filed by the New York State Natural Gas Corp. on November 19, 1942.

The order states that the acquisition is and will be required by the present and future public convenience and necessity and adds that the dissolution of the Keuka company will result in a saving of manpower by eliminating the keeping of books and records and the preparation and filing of reports.

January Allowables Assigned Two Texas Natural-Gas Fields

AUSTIN, Tex. — Allowable production of sour natural gas in the West Panhandle field during January has been set at 638,156,000 cu. ft. daily in an order issued last week by the Railroad Commission.

The commission found that the demand for sour gas is relatively constant and is responsive generally to economic conditions rather than seasonal influences and that abrupt changes in the allowable production disrupt and hamper the operations and processors and purchasers of the gas.

Allowable gas production in the Rodessa field Cass County, Texas, for January was set at 40,364,000 cu. ft. daily.

Rogers Succeeds Morse as Head Of Union Gas Co. of Canada

David P. Rogers has been elected president of the Union Gas Co. of Canada succeeding S. A. Morse, who has retired on account of ill health. Mr. Morse's place as general manager will be taken by T. M. Weir, who has been released by the military authorities for this purpose. Mr. Morse will continue to be associated with the company as chairman of the board.

Lacy's Offer to Supply Gas For "Big Inch" Line Rejected

LONGVIEW, Tex.—Roger Lacy, East Texas oil man, made an offer last week to give the Government 25,000,000 cu. ft. of gas daily from a Cass County well located ¼ mile from the 24-in. War Emergency oil line. His offer was to fill the line with gas while waiting for oil-pumping equipment to be installed. The offer was rejected because facilities on the line are not suitable for handling gas.

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Recycling News

South Texas Recycling Operations to Be Reviewed

AUSTIN, Tex.—A hearing to determine whether conservation rules applicable to recycling operations in the Agua Dulce field, Nueces County, Southwest Texas, are adequate and whether there is general compliance will be held here January 13 by the Railroad Commission.

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Dr. Midgley Elected Chemical Society President for 1944

NEW YORK. — Dr. Thomas Midgley, Jr., vice president of the Ethyl Corp. and internationally known for his discovery of tetraethyl lead, has been elected president of the American Chemical Society for 1944.

Dr. Midgley, who is active in furthering wartime research projects, will take office as president-elect on January 1, 1943, when Dr. Per K. Frolich, director of the chemical division, Esso Laboratories of Standard Oil Development Co., Elizabeth, N. J., and a leader in the development of synthetic rubber, becomes president, succeeding Dr. Harry N. Holmes, head of the department of chemistry at Oberlin College.

The new president-elect was chosen by the A.C.S. council from four nominees receiving the largest number of votes in a national mail ballot of the society's approximately 32,000 members. The council includes national officers, directors, editors of the society's publications, past presidents, chairmen of 18 professional divisions, councilors from the society's 100 local sections, and councilors-at-large.

Dr. Walter A. Schmidt, president of the Western Precipitation Co., Los Angeles, Calif., was elected a director-at-large to succeed Dr. Midgley.

Dr. Midgley has contributed largely to the knowledge of the chemistry of rubber and the methods of synthesizing rubber. With Dr. Albert L. Henne of Ohio State University, he developed the organic chloroflurides which have become widely used as noninflammable, nontoxic refrigerants. He was associated with the developments connected with the recovery of bromine from sea water.

Dr. Midgley is vice president of Kinetic Chemicals, Inc., chairman of the board of the American Chemical Society, and vice president of Ohio State University Research Foundation. He holds about 100 patents.

High Priority Ratings Required on All Copper

Referring to the last paragraph, "Future Rubber Policy Second Only to Winning Present War," page 18 of the October 15 issue of The Oil and Gas Journal, beginning "The major problems in furnace design . . . "

The Journal is informed by Meehanite Metal Corp., Pittsburgh, Pa., that the company is able to obtain the necessary metals for castings required for furnace construction up to 50 per cent of the A-1-a priority ratings or higher, as of that date; 35 per cent on A-1-d or higher, and 15 per cent on A-10 or higher. Copper, and therefore Meehanite castings, could not be obtained on ratings lower than A-1-a.

Inter-American English Section Starts Next Page

Musgrave Accepts Supply and Distribution Post in District 2

CHICAGO, Ill.—Charles R. Musgrave, vice president of Phillips Petroleum Co., and an active member of numerous petroleum industry emergency committees, has been appointed manager of supply and distribution for District 2. He will be permanently located at the petroleum industry District 2 headquarters in Chicago.

C. R. MUSGRAVE

Mr. Musgrave's assignment will be to coordinate supply and distribution and transportation in the district, so that petroleum and petroleum products are made available for military and necessary civilian requirements with a minimum use of transportation facilities and services.

Mr. Musgrave is vice president in charge of transportation and a member of the board and executive committee of the Phillips Petroleum Co., a member of the Supply and Distribution Committee and of the Transportation Committee for District 2, and chairman of the Joint Tank Car subcommittee; he is also chairman of the Advisory Group on Traffic Routing and Movement to the Office of Defense Transportation, and for some time past has devoted almost all of his time to petroleum industry activities.

FPC Terminates Proceedings Against Panhandle Eastern

WASHINGTON, D. C.—The Federal Power Commission last week announced its order terminating proceedings on rate agreements between the Panhandle Eastern Pipe Line Co., Michigan Gas Transmission Corp. and Northern Indiana Public Service Co. which the Public Service Commission of Indiana alleged may adversely affect rates to natural-gas consumers in Fort Wayne, Bluffton, Huntington, Decatur, Columbia City, Preble, Osian, and South Whitley, Ind.

Southern France Drilling Program Fails to Hit Oil

Exploratory drilling for oil in southern France has yielded gas but no oil, indicates the European press. Exploration has been undertaken by Regie Autonome des Petroles, which shares drilling rights with Pechelbronn and d'Aquitaine in the region of Saint Marcet-au-Lon.

Of three wells recently drilled, one yielded gas at 5,000 ft., a second at 4,000 ft., and a third was carried to 9,000 ft. without results. Carrying the first well to 8,000 ft. brought no oil.

Latin-American Oil Has Brilliant Future

By Ruth Sheldon

A YEAR of the exigencies of war has imposed many disadvantages and hardships on the South American oil picture but, at the same time, it has so radically altered conditions and policies that a more glowing pattern for future development is emerging than oil men or South America itself ever anticipated.

Behind the decidedly optimistic picture of things to come lies an absorbing story of gruelling and unceasing labor on the part of the U. S. Government, the governments of the South American republics and the oil industry.

When Europe plunged into war, the first ominous storm clouds on the South American horizon began to gather in May 1941, when over 40 United States controlled tankers were diverted to the British supply service to build up depleted oil stocks in Britain. This threatened to reduce considerably supply service to the eastern United States and to importing South American countries unless a preventive program could be worked out.

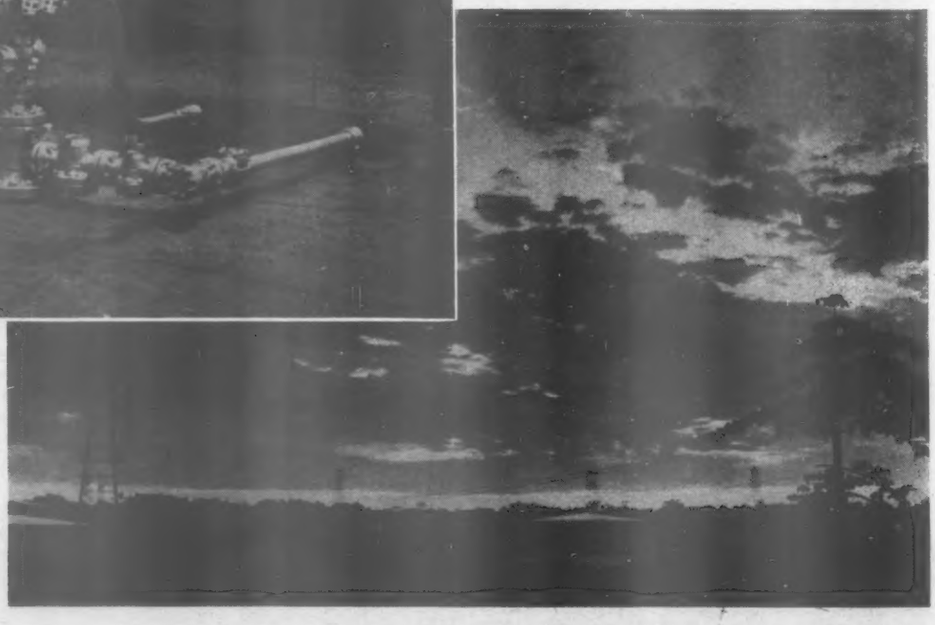
As South American oil-importing countries, Chile, Bolivia, Argentina, Paraguay, Uruguay, Brazil and the Guianas, are almost completely dependent upon United States tankers to keep them supplied, the marine supply problem became the most urgent. South American producing countries had sufficient supplies of equipment on hand to tide them over an emergency.

American oil companies were in a position to supply their own customers in South America, but government and local marketing organizations would be unable to obtain facilities. At this point the U. S. State Department stepped in, declaring that "countries, not customers must be supplied." Max W. Thornburg, petroleum adviser to the State Department, recommended establishment of an official Pan-American "pooling" plan, similar to the Empire "pool," whereby oil companies and organizations would suspend competitive activities, use each other's terminal, storage, transportation, and other facilities to the best advantage, achieve practical cooperation and collaborate with the governments of each country affected. He advised that an estimate of necessary reduction of supplies be made and pool committees would see that all countries received an equitable share of available supplies.

Shortly afterwards the Petroleum Supply Committee for Latin America was set up in connection with the Office of Petroleum Coordinator (now the Petroleum Administration for War) and the State Department to carry out this plan. Instructions were sent by the State Department to all United States South American embassies and legations to invite cooperation of the other American republics. A pool committee was to be composed of representatives of all oil organizations and the government in each country. Joining the pool was put on a voluntary basis. Gradually, each country organized its own cooperative machinery and the pool went to work, not without difficulty however. For such a radical departure from the established way of handling things was approached by a number of governments with caution mixed with suspicion. The aims, the reasons for the pool all had to be threshed out in countless conferences until full understandings were reached.

First consideration was to utilize tanker space to greatest advantage. For example, it had long been the practice to ship crude oil from Peru to Canada and for California to ship fuel oil to the nitrate and mining interests in Chile. A long crosshaul of tankers was the result. The pool committees worked out arrangements for Peru to supply Chile with fuel oil and for California to supply Canada with crude. This eliminated tanker time from California to Peru in both operations, making that tanker time available for trips elsewhere. A simple solution, but a complicated one to work out, involving rearrange-

Above: Christmas tree hookup on dual-zone producer in eastern Venezuela's important Oficina field where multiple-oil pays give operators wide selectivity in completion practices



Right: Twilight panorama of Tropical Oil Co.'s producing operation at El Centro in Colombia

ments of charters and contracts of many companies. Only a pool with the cooperation of all companies and governments involved could effectually work out such a rearrangement.

So efficiently were such innovations put into effect that by October 1941 the threatened shortage was averted and Latin-American petroleum requirements were being met 100 per cent. But the pool committees were constantly alert to prevent shortages resulting from emergency situations. In November, the Bolivian ambassador in Washington told the State Department that unless 30,000 bbl. of diesel oil could be supplied by the end of December, the strategic tin mines in southern Bolivia would be forced to shut down until the next scheduled tanker arrived the end of February. The Bolivian pool committee had only been organized a few weeks previously so that no machinery had existed in the country to prevent such a serious situation developing. The pool arranged for an exchange of oil cargoes between the company which had the supply contract and one which had a cargo near at hand so that 35,000 bbl. of diesel oil and 30,000 bbl. of fuel oil arrived in Bolivia in time to prevent suspension of mining operations.

In May of this year the picture changed for the worse. Six months of war, necessity of supplying far-flung active battle fronts, intensive submarine warfare, all resulted in such a shortage of tankers that an actual products shortage materialized in North and South America. Gasoline rationing on the United States East Coast went into effect. South American importing countries were informed it would only be possible to deliver petroleum sufficient to meet two-thirds of their requirements based on 1941 consumption figures. A month later this was cut to one-half and even this one-half was stated to be subject to war hazards.

Supply Committee Functions

The Petroleum Supply Committee for Latin America inaugurated a new policy. The United States would assume the burden of supplying essential war needs in South America—military forces, merchant ships, air lines, mining and transportation of certain strategic materials—but other needs would be prorated according to the amount available. Not only that, but tankers would be sent where the unsatisfied need was greatest rather than depending upon 1941 import figures alone.

Although the South American countries had cooperated in the pool arrangement it became evident that certain of them did not fully appreciate the urgency of the situation and gasoline consumption figures for 1942 in some cases were actually higher than 1941. They were drawing on reserve stocks to make up the supply deficiency. The State Department urged inauguration of conservation and rationing programs which have now been worked out.

While the South American petroleum importing countries were coping with these problems, the position of the exporting countries—Venezuela, Colombia, Ecuador and Peru—were acute. Due to the tanker shortage they were in no better position to export than the other countries were to import.

The situation was most serious in Venezuela, for it is essentially a one-crop country, at present depending upon its tremendous oil production for its national income. Next to the United States, of course, it is the largest oil-producing country in the world, capable of producing 800,000 bbl. daily. Just off its Caribbean coast line, the two Dutch islands of Aruba and Curacao, where Standard Oil Co. (New Jersey) and Royal Dutch-Shell subsidiaries have built the two largest refineries in the world, were refining five-eighths of Venezuela's oil and the majority of this was being sent to supply England's war needs.

Hitler's first major attack in the Caribbean area was directed against the refinery at Aruba and the fleet of lake tankers which shuttles the oil from the mainland to the islands' refineries. In February, German submarines shelled the Aruba refinery and sank a number of tankers. The submarine menace caused Venezuela's production to fall off 80 per cent. Gradually it has come back, but the country is producing only half of its capacity.

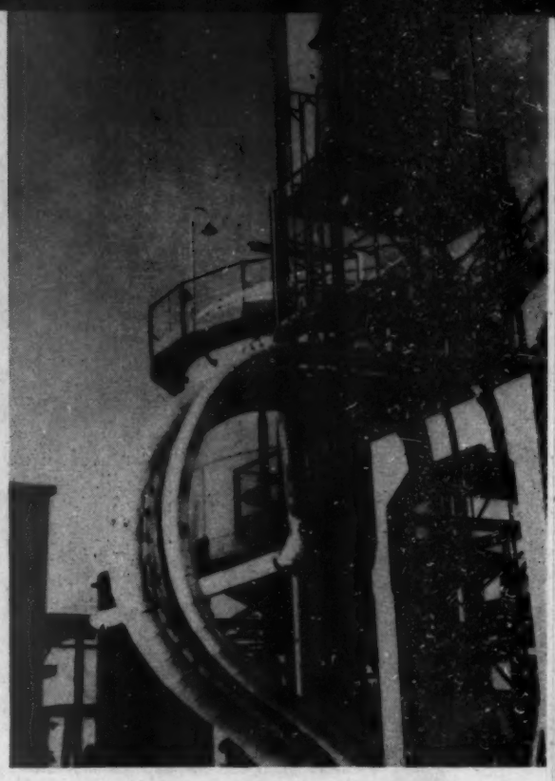
As approximately two-thirds of Venezuela's income is derived directly and indirectly from oil, the loss of revenue is having serious effects. Venezuela has no foreign debt whatsoever and very little internal debt, but is now obtaining loans from the United States.

Ecuador Operations Reduced

Ecuador, which formerly exported approximately 8,000 bbl. daily, has been able to ship only a tankerful occasionally. Production has been cut to only domestic needs. As oil supplied approximately 6 per cent of government revenue in a country with an extremely low federal income even in normal times, the loss has been felt acutely. Colombia's oil production of some 75,000 bbl. daily decreased approximately 50 per cent due to lack of tanker arrivals. Here again the loss of oil revenue has been felt sharply. Peru is the only export country which has fared reasonably well so far, primarily because it has the only large refinery on the West Coast of South America and its 36,000-odd bbl. daily is used principally to supply gasoline and fuel-oil needs for Peru, Chile and Bolivia.

Added to all these problems was that of equipment supply. Refineries must be kept going, pipe lines must operate, drilling programs—albeit severely curtailed ones—must be maintained to offset depletion of reserves. Material for drums and cans must be supplied—a matter of major importance in the South American system of distribution where burro back generally replaces tank cars and trucks throughout South America.

Officials of the Office of Petroleum Coordinator, Board of Economic Warfare, War Production Board and State Department wrestled with the task of distributing too little too many places and trying to coordinate equitability of treatment with strategic war necessity. Delegations of perturbed South American oil officials arrived regularly in Washington to discuss their needs, both of equipment and oil.



Part of the chemical treating plant at the A.N.C.A.P. refinery in Uruguay where operations have been curtailed because of the difficulties in transporting crude from producing countries

South America's total of one-fifth of Western Hemisphere production assumed daily greater importance in helping supply United Nations war industry and civilian oil needs as some 218,000 bbl. daily production in the Far East was destroyed or captured by the Japanese, as Hitler gained control of the Russian Caucasian fields and as the Near East's approximate 326,000 bbl. daily production became more endangered.

In spite of the excellent, and in many cases remarkable, job the various agencies and commit-

(Continued on Page 108)

About the Author . . .

Ruth Sheldon was appointed by Petroleum Administrator Ickes as a petroleum specialist on his staff in July 1941 and left the following month for South America as his personal representative to make a survey of the oil situation. This was the first time such a specialized survey had been made for the Government. During 5 months Miss Sheldon inspected all the oil fields and refineries of Venezuela, Aruba, Curacao, Colombia, Equador, Peru, Chili, Argentina, Uruguay, Brazil and Trinidad and spent considerable time in the capital of each country conferring with government officials and oil-company representatives. Since her return she has been attached to Petroleum Administrator Ickes' office in Washington where she has been working on South American oil matters. Miss Sheldon has written special articles for The Oil and Gas Journal before. Among them was a series of articles on the Mexican oil situation a year after expropriation when at the request of the Mexican Government she made a special survey of their oil properties. She is also oil writer for the Saturday Evening Post and other national publications.

The author is posing here with a group of Yacimientos Petroliferos Fiscales officials in the Comodoro Rivadavia, Argentina, camp. Pictured are A. Catinari, geologist; Francisco Rapallini, assistant manager; Ruth Sheldon, the author; Roberto Raventos, manager, and Jose O. Martinez, petroleum engineer

Phenol plant and the new cooling tower at Barrancabermeja refinery of Tropical Oil Co., across the river from Shell's new field

J. A. Wintersohn, superintendent of Shell's Yondo block operations (holding stick) explores lease conditions after Magdalena River flood

Colombia's Casabe Field Showing Major Caliber

By E. OSPINA-RACINES

BOGOTA, Colombia.—Shell's discovery of a major oil field in the middle Magdalena Valley some 300 miles from tidewater and the promising prospects of two additional commercial fields in the Socuavó and Tres Bocas areas of the Colombian Petroleum Co. (Texas-Socony) Barco concession are the net result of an intense wildcatting program during the year. Preliminary findings of the Casabe structure were announced a year ago in The Oil and Gas Journal's International number. Subsequent exploration during this year has revealed a major oil field whose potential right now assures its commercial exploitation in the near future.

As may be noted from the accompanying table, 7 Casabe is now drilling on the Yondó block of the Shell, 5 and 6 Casabe having been brought in for 1,200 and 1,000 bbl. per day, respectively under natural flow. Shell continued its wildcatting program during the year and drilled directly or under contract the Palagua, El Doce, El Dificil and Casabe tests. El Brillante is expected to spud shortly. No. 7 Casabe was spudded October 19 and within 12 days was reported drilling at 2,903 ft., having set 9⅝-in surface casing at 352 ft. and a 6⅝-in. string at 2,417 ft. The Casabe sands are reported lenticular, but never the less of an exceptional total thickness. Infantas and La Cira sands in the De Mares concession, located due east from the Casabe structure, range from 50 to 200 ft. in thickness. Casabe sands are several times thicker.

Casabe crude averages 21.5° A.P.I. which may be compared to current pipe line De Mares crude of 24.5° A.P.I. The latter sold f.o.b. Mamonal export terminal during the first 6 months at $1.06 per barrel, weighted average price. Casabe crude would, therefore bring, a comparable price. The Casabe field is located strategically as an export producer, the Andian common carrier is practically at its edge and the current tariff for the 300-mile haul to Mamonal is only 55 centavos (31.4 cents). The Yondó block, where the Casabe field is located was contracted September 15, 1938. Oil concessions in the Magdalena Valley carry a maximum 9-year exploratory period before the 30-year exploitation period begins automatically. However, if an operator finds himself in favorable conditions as to the potential of the field and a pipe-line outlet, he has the option to enter into the exploitation period any time during the primary period. During the exploration period and according to concession contract stipulations, the operator is obliged to install within the grant and maintain in continuous operation at least one drilling rig during the first 3 years. To obtain additional exploratory years thereafter, at least two wells must be spudded during each year. Failure to solicit and obtain additional exploratory years carrying the consequent drilling obligations results in having the concession pass into the exploitation period. The significance of this is explained by the recent Supreme Court decision on drilling obligations outlined herewith.

During the exploratory period, oil operators are liable to a surface fee which increases gradually every year. The Yondó block comprises 46,880 ha. or 115,600 acres. The surface rental for the fifth exploratory year being 40 centavos per hectare per year, or 9.25 cents per acre; the total outlay amounts in this case to the sizable sum of approximately $10,600. The fee for the ninth year amounts to 46 cents per acre. In addition to this direct payment, operators engaged solely in exploration are liable to the patrimony or capital assets levy. Last year, oil operators engaged only in exploration paid the government 102,000 pesos in surface fees and 156,000 pesos in patrimony taxes. In reality, therefore, exploration fees are already 2.5 times the value fixed by law in view of the patrimony levy established in 1935 after the oil law was enacted. A recent bill submitted to Congress by the minister of oil asked to have the surface fees increased. On the other hand, former Minister of Finance Esteban Jaramillo, now general manager of an oil-royalty enterprise, submitted a memorial to Congress pointing out the uneconomic aspect of levying taxes on oil exploration, suggesting that the patrimony levy should be lifted, at least for those enterprises engaged in the search for new oil fields. It is of interest to note that the Government receives in royalties and income taxes 100 times the revenues it collects as surface fees. This comment points out that by foregoing a burdensome patrimony tax during exploration, the Government will eventually benefit much more from exploitation revenues.

Shell drilled the El Doce test, located some 125 miles from Caribbean tidewater, in the Magdalena department. This test as may be seen from the table, reached the basement rock at 3,062 m. (10,-

046 ft.). El Doce was spudded on March 13, set 13⅜-in. surface casing at 342 ft., and a 7-in. string at 8,649 ft., but was abandoned during September. Recovery of the 7-in. string was attempted, retrieving 1,980 ft., or 23 per cent of the total string set. In view of the restrictions on materials right now, such effort is exceedingly valuable. Another Shell test within the El Doce concession, 1 El Brillante, was spudded during the latter part of November. In the adjacent tract, north of El Doce concession, Shell is drilling 1 El Dificil under contract which was spudded on July 18 and as of November 1 it had reached 4,556 ft., having set 9⅝-in. surface casing at 978 ft. Considerable gas pressure, requiring a heavy mud, has been encountered and hopes were aroused for future of this test. In the Magdalena department where Shell is drilling these tests, some 860,000 acres are under contract or solicited in concession by various operators. If the tests now under way prove commercial production, this prospective oil area will no doubt see considerable drilling activity due to its close proximity to tidewater, general flat topography and favorable geological features.

Richmond Active in Search

Richmond Petroleum Co. of Colombia (Standard Oil Co. of California) carried out extensive surface and subsurface geological and geophysical studies in the Magdalena Valley, Caribbean Coast, and in the Llanos region, some 750 miles inland. Richmond drilled under contract the Braval and Culimba tests in the Camacho and Villamizer tracts, as may be noted in the accompanying wildcat table. These tracts measure 105,000 acres and 37,200 acres, respectively. In addition to the Culimba and Braval tests, all of which penetrated the Cretaceous without positive showings of oil or gas, a number of structural holes were drilled for the purpose of carrying out Schlumberger surveys and to obtain core samples for heavy mineral and fossil analyses. These investigations may be carried out much more rapidly with portable rigs than with the standard equipment, particularly in areas of dense tropical growth which call for expensive road construction, if a standard rig is to be moved. These structural holes permit a wide study and subsurface mapping of the concession, not possible by other means.

In the Llanos region, Richmond has a concession covering 247,000 acres. According to the contract, a drilling rig is scheduled to be installed by December 1944. Considerable geophysical study has been made of this area, using both gravity meter and seismograph methods. Exploration in the Llanos will not be possible until after the war because of its distance inland. Owing to wartime shortage of material, exploration will be confined to areas near seaboard.

Texas Petroleum Co. carried out considerable reconnaissance work throughout the country with its large staff of geologists, studying lands owned in fee, those held under lease, and in the search for new prospects. Texas has an application filed covering a 247,000-acre tract in the Llanos and on several tracts in the Caribbean coastal area. Geophysical parties were active on various promising areas. Plans were under way for test drilling on the Salcedo tract, owned in fee by Texas, but in view of its location from seaboard, without facilities of a common carrier, the priority application for drilling equipment has been delayed. Texas was favored recently by a Supreme Court decision on a large block of private leases in the upper Magdalena, Chaparral area, and undoubtedly tests drilling will be carried out there in the future.

Socony-Vacuum Co. of Colombia has drilled directly or under contract a number of tests in the middle Magdalena Valley. The MacCarthy well was abandoned at 5,438 ft. The well was located on the basis of gravitymeter and seismograph work. No. 2 Cimitarra was spudded on August 31 having set 16-in. surface casing at 137 ft. No. 1 Cimitarra, drilled last year, showed some gas and oil. Operations at 2 Cimitarra have been suspended recently due to the rise of the Magdalena River which has flooded the countryside. A recent private oil-title decision by the Supreme Court on a tract in the Tubará Caribbean Coast region, favorable to the lease held by the Socony-Vacuum, forecasts some wildcat drilling operations in the near future.

Tropical Oil Co. explored the Gutierrez tract located just north of the Yondó block. Two tests were drilled, but were unsuccessful. Surrender of the 41,800-acre tract is now before the ministry for acceptance. Tropical has filed several applications for concessions in the Magdalena Valley and on the Caribbean Coast and is carrying out surface work in the Llanos. In the De Mares concession both Infantas and La Cira structures have been completely delimited by drilling. A total of 1,180 wells have been drilled in the concession, of which 64 have been abandoned as of July 1, 1942. Crude-oil production of the De Mares totaled 298,441,666 bbl. from 1921 to July 1, 1942. Of this amount 266,586,139 bbl. were delivered to the Andian pipe line. Since pipe-line shipments and ex-

(Continued on Page 122)

TABLE 1—WILDCAT DRILLING IN COLOMBIA SINCE PASSAGE OF AND UNDER OIL LAW 37

Company—	Concession	Well	Maximum depth reached—ft.	Results
1. Tropical Oil Co.	Putana	1 Lisama	4,729	Abandoned
		2 Lisama	2,793	Abandoned
		3 Lisama	7,625	Abandoned
	Guiterrez	1 Cimitarra	9,502	Abandoned
		2 Cimitarra	4,171	Abandoned
2. Socony-Vacuum Oil Co. de Colombia	Restrepo	1 Las Monas	1,041	Noncommercial producer
		1-A Las Monas	3,479	Abandoned
		2 Las Monas	6,984	Abandoned
		3 Las Monas	3,861	Abandoned
		1 Narino	6,515	Abandoned
		3 Narino	10,740	Abandoned
		1 Peralonso	9,274	Abandoned
3. Cia. de Petroleos del Carare	McCarthy	1 McCarthy	5,438	Abandoned
4. Cia. de Petroleos del Valle del Magdalena	Cimitarra	1 Cimitarra	1,495	Abandoned
		2 Cimitarra	3,370	Drilling
5. Cia. de Petroleo Shell de Colombia	Mora	1 Monteoscuro	9,180	Abandoned
		2 Monteoscuro	2,990	Abandoned
	San Juan	1 Puerto Parra	10,910	Abandoned
		1 Sullivan	2,683	Abandoned
	El Doce	1 El Doce	10,046	Abandoned
		El Brillante	....	Rigging up
6. Cia. de Petroleo La Estrella	El Dificil	1 El Dificil	4,566	Drilling
7. Cia. Colombiana de Petroleo El Condor	Consorcio	1 Zambito	2,395	Water well
		1 Baul	7,450	Abandoned
		1 Ermitano	1,602	Abandoned
	Yondo	1 Casabe	8,280	338 bbl. daily
		2 Casabe	3,663	250 bbl. daily
		3 Casabe	3,582	771 bbl. daily
		4 Casabe	3,640	208 bbl. daily
		5 Casabe	3,630	1,200+ bbl. daily
		6 Casabe	4,002	1,000+ bbl. daily
		7 Casabe	2,903	Drilling
8. Cia de Petroleos La Perla	Obregon	1 Palagua	3,550	Abandoned
9. Compania de Petroleo Occidental	Villamizar	1 Culimba	2,069	Abandoned
		2 Culimba	4,273	Abandoned
10. Cia de Petroleo Sierra Nevada	Camacho	1 Braval	2,812	Abandoned
		2 Braval	3,544	Abandoned
11. Sociedad Nacional del Carare	Carare	1 San Fernando	4,745	Abandoned
		2 San Fernando	9,272	Abandoned
		1 Monteoscuro	6,550	Abandoned
12. Colombian Petroleum Co. (Under special contract approved by Law 80 of 1931)	Barco	1 Carbonera	2,722	50 bbl. daily
		2 Carbonera	2,234	82 bbl. daily
		3 Carbonera	3,359	66 bbl. daily
		1 Leoncito	3,045	Abandoned
		1 N. Sardinata	5,005	Abandoned
		2 S. Sardinata	3,964	Abandoned
		1 Socuavo	9,850	535 bbl. daily
		2 Socuavo	5,675	432 bbl. daily
		3 Socuavo	2,404	Drilling
		1 Tres Bocas	5,400	18 bbl. daily
		2 Tres Bocas	1,987	Lost
		2-A Tres Bocas	9,223	500 bbl. daily
		3 Tres Bocas	4,760	178 bbl. daily
		Rio de Oro Petroleo	13 wells have been drilled	
13. Tropical Oil Co. (Under special contract prior to Law 37 of 1931)	De Mares	Infantas	137 wells have been drilled	
		La Cira	1,180 wells have been drilled within the concession up to July 1, 1942	

These are top men in Foreign Division. Alexander H. Chapman, assistant to the director; W. D. Crampton, associate director; James Terry Duce, director; C. Stribling Snodgrass, associate director

PAW Division Coordinates Foreign Petroleum Affairs

By HENRY D. RALPH

This is the sixth of a series on the organization, personnel, and functions of divisions of the Petroleum Administration for War, formerly the Office of Petroleum Coordinator.

Similar reviews appeared September 10, October 1, November 5, and December 10 issues on the production, refining, transportation, and marketing divisions. The series started in the September 3 issue with a discussion of the over-all functions of the entire petroleum organization.

WASHINGTON, D. C.—Closer coordination of federal Government policies and activities pertaining to international-petroleum trade and the export of oil-industry machinery and equipment is resulting from the operation of President Roosevelt's executive order of December 2, 1942, creating the Petroleum Administration for War.

Many details remain to be worked out, particularly in handling applications to export equipment, as the new PAW must be dovetailed carefully into the operations of other government agencies such as the Department of State, Board of Economic Warfare, Office of Lend-Lease Administration, War Shipping Administration, and the War Production Board. This is not a very difficult task, however, as the new PAW is basically the old Office of Petroleum Coordinator with new powers and duties.

As to foreign affairs, the executive order says that the Petroleum Administrator for War shall "collaborate with the appropriate federal departments and agencies authorized to determine plans and policies with respect to foreign petroleum activities. The administrator shall, in conformity with such plans and policies, issue directives concerning the physical operations of their foreign petroleum facilities to units of the American petroleum industry which directly or indirectly engage in such operations in foreign countries. The administrator shall be the channel of communication on foreign petroleum matters between the federal departments and agencies and such units of the American petroleum industry."

The order also specifies that its provisions shall not limit in any way the functions and authority of the Secretary of State, under the direction of the president, in the formulation of the foreign policy and the conduct of foreign relations of this Government.

These provisions simply mean: (1) the State Department continues to set over-all foreign policies; (2) PAW has a voice in all foreign policies and activities relating to oil; and (3) PAW may by itself direct the activities of foreign subsidiaries of American oil companies.

The PAW is a temporary, wartime agency of the Government, responsible only to the president of the United States. The Petroleum Administrator is ex-officio the Secretary of the Interior, Harold L. Ickes. Subject to Mr. Ickes' direction, foreign oil matters are handled by the Foreign Division of PAW, which was taken over unchanged from the old OPC.

For many months the Foreign Division has had close working relationships with other government agencies concerned with foreign affairs, even though OPC had a dubious legal status and little real authority. For the most part these relationships are continuing, and while there are some changes in interagency procedures within the Government there will be few innovations affecting foreign nations or the general public.

Of great assistance in coordinating the activities of the various government agencies with the foreign policies of the State Department is Max W. Thornburg, special adviser on petroleum matters to the under secretary of state. Mr. Thornburg has had years of experience in the oil business in the Near East, and he assists the Department of State in foreign policy matters pertaining to oil and consults with the various federal agencies on any problems connected with foreign petroleum activities when government policy is involved.

The Foreign Division is a relatively small section of PAW, and because of the military secrecy surrounding so much of its work it operates pretty much as a unit by itself and its activities seldom reach public notice.

The top officials of the Foreign Division have all had years of experience in oil operations abroad. The director of the division is James Terry Duce, who is on leave as vice president and director of the California-Arabian Standard Oil Co. From 1920 to 1939 he was vice president and general manager of the Texas Co. subsidiaries in South America. Mr. Duce was chairman of the production section of the petroleum division of the American Institute of Mining and Metallurgical Engineers from 1930 to 1940.

There are two associate directors of the division. Foreign supply and distribution matters are in charge of W. D. Crampton, formerly vice president of the Standard Francaise des Petroles, Paris, France, where he was located for 22 years. Foreign refining activities, coordination of product specifications, and liaison with British agencies are handled by Associate Director C. Stribling Snodgrass, lately managing director of Snodgrass, Perrin & Co., Ltd., London, England. After the fall of France, Mr. Snodgrass volunteered for

service in the Navy, from which he came to the Foreign Division in September 1941.

Problems connected with exporting petroleum machinery and equipment are handled by Alexander H. Chapman, assistant to the director. Mr. Chapman was with the Standard Oil Co. (New Jersey) and its subsidiaries from 1928 until he came to the Foreign Division in March 1942. He was in Rumania from 1928 to 1935, in England from 1935 to 1940, and was chief engineer and superintendent of the Portland Pipe Line Co. from May 1941 to March 1942.

The staff of the Foreign Division is currently being expanded to take care of its increased duties in allocating materials and equipment, and most of the new men have also had experience in foreign oil operations.

The two most important activities of the Foreign Division are concerned with supplying petroleum products to friendly nations not producing their own oil, and with supervising the export of petroleum machinery and equipment manufactured from critical materials so badly needed for so many war purposes. In both these functions the Foreign Division cooperates closely with several other government agencies and is subject to over-all policies and conditions determined jointly with these agencies.

Tanker Pool Formed

Supplying petroleum products to South American countries, England, Canada, the Atlantic Coast region of the United States, and to other parts of the world depends primarily on the disposition of the fleet of tankers under the American flag or subject to the control of the U. S. Government. Before the United States became engaged in the war it was the policy of this Government to provide aid to England, and part of this aid was the diversion of many tankers to transport oil across the Atlantic. This left fewer tankers than were needed to supply all the oil requirements of the Western Hemisphere, and the policy was set that all nations should share equitably in the available tanker service. After the United States entered the war the situation became even more acute because of sinkings by the enemy and the need for tankers to supply the fighting forces.

To meet these conditions, the pooling idea was adopted in the summer of 1941. The various Latin-American countries were urged to form pools of petroleum distributors, both private and government-owned, for equitable allocation within each country of such oil supplies as might be available. A tanker pool was then organized in New York by operators of tank ships, functioning in cooperation with the U. S. Maritime Commission (and now with the War Shipping Administration) and with the State Department. This arrangement was formalized by OPC Recommendation 9, issued August 26, 1941, and still in effect under the PAW. This created the petroleum supply committee for Latin America and authorized all companies engaged in the international oil trade to pool their facilities, exchange supplies, and in other ways make most efficient use of available tankers. As a result, tanker routes and sources of supply were rearranged in order to provide the shortest possible hauls, and very large increases were thus made in the deliveries of the tankers remaining in this service. In allocating tanker service this committee is bound by the government policy that all American republics obtain the same proportion of their petroleum needs as is furnished portions of the United States supplied by ocean tanker.

Every effort is made to fill all petroleum requirements for essential war purposes in each of the countries, and other petroleum needs are then scaled down to meet whatever tanker facilities are available to the pool. Argentina alone remains outside the tanker pool, because it produces nearly enough petroleum to meet its requirements and has its own tanker fleet to import the remainder.

The pooling idea was carried even farther in Recommendation 38 issued October 20, 1942, covering the Foreign Operations Committee. This committee is composed of representatives of United States oil companies producing or refining petroleum abroad or in exporting oil from the United States, and it functions under the guidance of the PAW Foreign Division. This committee and the companies involved are authorized and directed to cooperate with agencies of this or other governments in working out plans to meet the petroleum needs of the military forces, war industries, and essential civilian requirements of the United States, its allies, and other friendly nations outside of the continental United States. The companies may use each others' facilities and exchange oil and shipping space in order to shorten tanker runs and reduce idle time in port.

Another project designed to eliminate unnecessary tanker movements is known as Plan 24, under which the Caribbean area refining committee coordinates the activities of refineries in that area, regardless of ownership, in order to increase the output of aviation gasoline and other petroleum war products and to utilize tanker tonnage most effectively.

Coordination of specifications for petroleum products has also simplified supply and transportation problems and reduced storage requirements. The Foreign Division, in cooperation with other federal departments and with foreign governments, has worked out a standard specification for all-purpose motor gasoline for the ground forces of all the United Nations, and has also aided in simplifying the specifications of various petroleum products exported to many countries by the Lend-Lease Administration or otherwise.

Equally great difficulties surround the problems of supplying petroleum operations in Latin America and other countries with machinery and equipment, and this is also a responsibility of the PAW Foreign Division. All uses of steel and other critical materials are closely controlled by the War Production Board and are parceled out through preference ratings and allocation orders to the most essential uses, so that only limited supplies are available for the oil industry abroad. Further complications are the shortage of shipping space and the fact that all exports must be closely checked to determine the necessity for them and to be certain that they do not fall into the hands of enemy agents.

Equipment Export Procedure

For these reasons the export of oil equipment has been surrounded with a great deal of administrative detail, and now a new system is being worked out as a result of the executive order creating the PAW and because of the operation of the Controlled Materials Plan. Under the CMP, the WPB undertakes to allocate all steel, copper and aluminum, and their alloys, in accordance with estimates of requirements submitted four times a year by a dozen different "claimant agencies." These claimant agencies include the Army, Navy, and other government agencies including the PAW. Thus PAW must submit estimates of the amounts of these materials which will be needed by both the domestic and foreign oil industries each quarter, and it is now engaged in drawing up such estimates for the second quarter of 1943. When all the estimates are in, the WPB makes allocations to each claimant agency

Max Thornburg Well Qualified For Oil-Policy Assignment

Max W. Thornburg, special petroleum adviser to the Department of State at Washington

MAX WESTON THORNBURG, special petroleum adviser to the Department of State, has one of the most important assignments in the wartime petroleum policy of the U. S. Government. He entered governmental service in 1941 and was selected for his broad experiences in relations with foreign countries as vice president in charge of operations abroad for the California Texas Oil Co., Ltd.

Most of the 5 years preceding his appointment to staff of the State Department were spent in London and the Middle East. He has traveled extensively in India and the Far East, was a member of several expeditions to the interior of Saudi Arabia and of a party of the first white men to explore northeastern Arabia.

After World War I, during which Mr. Thornburg rose to a captaincy in the Army, he joined Standard Oil Co. of California as a draftsman and engineer. He became chief engineer of refineries in 1926 and 3 years later he was made manager of the Standard of California refinery at Richmond, Calif. From 1930 to 1936 he was chairman of the company's engineering board. He then became a director and vice president of California Texas Oil Co. and of Bahrein Petroleum Co., Ltd., two Middle Eastern subsidiaries organized by Standard of California and the Texas Co. to produce, refine and market crude oil discovered on Bahrein Island in the Persian Gulf.

on the basis of amounts of materials known to be available and PAW must then apportion its allotment among all oil industry uses.

The Foreign Division already has made considerable progress in operating under the CMP and its allotments of steel and critical materials for the first quarter of 1943 have already been determined in many instances and schedules are now being drawn up for the second quarter. Methods of dividing these allotments among the various projects and applicants are now being worked out to provide the foreign oil industry with those materials it must have for essential operations.

Materials used by the oil industry which are not under CMP, such as manila drilling rope, will also be allocated by PAW under the general direction of WPB but on a slightly different procedure. Certain quantities of all critical materials will be set aside for oil operations in Latin America, and it will be the obligation of the Foreign Division to determine where these shall go and how they shall be used.

In making these determinations the Foreign Division must be guided by the policies of other government agencies in addition to WPB. It must follow the State Department rule that all American republics be treated equitably which, of course, does not mean equal tonnages to each country but that the needs of each country be given equal consideration. For example, little steel can be expected for exploratory drilling in areas remote from transportation facilities or where there is already ample production. Most favorable consideration would be given a project to produce or refine oil in regions which badly need petroleum products for the production of copper or rubber or some other critical war material.

General CMP Procedure

While procedural details remain to be worked out, the general functions of the Foreign Division under the CMP are these:

Obtain data from operating companies as to their future anticipated requirements for materials for operating, maintenance, and construction.

Scrutinize these lists to see that the uses are really essential and fit in with prearranged operating programs.

Prepare these scrutinized lists in the forms required by CMP and in committee with BEW, lend-lease and others concerned, present them to the WPB requirements committee and to appropriate WPB industry divisions.

Receive from WPB approved allocations of materials.

Process requests for materials submitted on Form PD-311.

Assist in the redistribution of idle materials which cannot be used by companies now owning them.

In addition, the Foreign Division will continue to maintain close liaison with other branches of the federal Government having an interest in foreign oil operations and assist them in the solution of such questions as fall within their special jurisdiction.

After the Foreign Division approves the use of materials for a foreign oil activity the shipment must have an export license from the Board of Economic Warfare before it can leave this country and then it must be allotted cargo space by the War Shipping Administration.

Until a new system of allocating materials is worked out and placed in operation exporters of oil equipment are continuing to use the method which has been in effect for some months.

Persons desiring to export, file a priority application on Form PD-311 if the material is for maintenance, repair or operating supplies, or on Form PD-200 if it is for a new construction project. Under the procedure known as the Foreign Petroleum Industry Material Plan, a priority application was filed at the same time as an application for a license to export the material and the two were handled together. The papers are routed through the Board of Economic Warfare, the Foreign Division of OPC (now PAW), the old foreign petroleum policy committee (now disbanded), the Department of State, the Coordinator of Inter-American Affairs, and the War Production Board. Then, with priorities and export license granted, a recommendation for shipping priorities was forwarded to the Office of Defense Transportation and the War Shipping Administration.

This complex procedure will be simplified under the new powers of PAW, though it may take some time to get all the details worked out. At any rate, Form PD-311 is still being used and will continue to be used until further notice. This form may be submitted by an American company for use by a foreign subsidiary, or by a foreign company through a certified agent or its embassy or legation in Washington. The State Department and PAW also have petroleum experts stationed throughout the world who can assist in this procedure.

•

Pooling Modifies Crisis in Australian Supply Problem

By R. R. PUGH
Assistant General Manager, Commonwealth Oil Refineries, Ltd., Melbourne

A REVIEW of the oil industry as it affects Australia and the direction in which the country is heading in this "vital stream of oil" involving the very life blood of civilization, is not only timely but exceedingly important.

Australia's consumption of petrol was, before the war, over 1,000,000 tons annually, actually over 360,000,000 gal. per annum. This would give a figure of 30,000,000 gal. per month or 1,000,000 gal. per day, which places Australia sixth on the list of consuming countries, being exceeded only by five others, viz., United States, United Kingdom, France, Germany and Canada in that order.

This high rate of consumption could, of course, not be sustained in wartime and petrol rationing was eventually introduced with the objective of reducing Australian civilian requirements to 12,000,000 gal. per month—a drastic reduction but one which has been accomplished.

Australia's sources of supply were chiefly the Netherlands East Indies and Iran (Abadan) with the addition of some indigenous fuels such as benzol and alcohol. Before the war the Anglo-Iranian Oil Co. refinery at Abadan was recognized as the world's largest refinery of its kind, and it may be surmised that since the war its output has increased materially in some directions. The Anglo-Iranian Oil Co. has had a great task thrust upon it by the enormous wartime demands as well as the increased demand due to the loss of other sources of supply.

Japan's entry into the war naturally placed a very different complexion on Australia's supply problem as Japan's policy has, of course, been in common with that of the Axis partners to attack Allied sources of supply, firstly to deprive the United Nations of oil requirements, and secondly to gain them for themselves.

In the latter regard the scorched earth policy has delayed Japanese employment of the spoils of victory, but she has certainly made Australia look elsewhere for supplies, and this is why all must be prepared to play their part in conserving supplies and avoiding waste. Japan's strategy, like that of the other Axis powers, is based upon the inadequacy of her own oil in this life and death struggle, and all her energies have been directed to obtaining a source of supply of oil. How far the scorched earth policy adopted in the Dutch East Indies will be effective remains to be seen because, despite the construction of the refineries at Palembang and elsewhere in the Indies, the Japanese are said to have some 30 refineries of their own in Japan capable of dealing with Netherlands East Indies crude.

Referring again to Australia's domestic arrangements apart from the vast quantities which are required for the fighting forces in Australia, the industry early in the war formed a cartel which meant the allocation to each oil company of a share of the market for petrol and other internal combustion fuels based upon its normal prewar business on a percentage basis. This was aimed at pegging each company's activities and eliminating unnecessary competition for the reduced domestic consumption. In the United Kingdom upon the outbreak of hostilities a petroleum pool was formed for the distribution and storage of all petroleum products. Under this arrangement all private brands disappeared and individual marketing ceased. One organization cares for all deliveries. Quality is maintained and joint services, the elimination of competition, pooling of resources and equipment all make for savings.

To supplement supplies of imported petrol Australia has made and is making much progress in indigenous fuels. The production of power alcohol from molasses has been developed in a greater degree in Queensland than before the war (4,000,000 gal. per annum are now produced) and in New South Wales and Victoria power alcohol is being produced from molasses in large quantities. Benzol is available in greater quantities due to much increased activity in the steel industry. The government has under consideration the production of alcohol from wheat in every state. Production of alcohol from wheat is, of course, very costly. A bushel of 60 lb. of wheat with a starch content of 65 per cent is estimated to produce 2¼ to 2½ gal. of alcohol. Taking the value of the wheat at say 4 shillings and a capital cost of production of 9 pence per gallon, the alcohol should cost about half a crown per gallon at the distillery. To this must be added freight to the point of consumption and distribution costs. Against the landed cost of petrol this product will be seen to be very expensive when it is appreciated that it is not contributing anything in direct taxation.

Since the war began the Newnes shale industry in New South Wales commenced to produce petrol. Production results have been a little disappointing, but the quality and quantity are both there, though the latter needs to be stepped up.

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WORLD WIDE EXPERIENCE

Argentina's Increasing Oil Production Big War Asset

ARGENTINA'S growing production of oil now provides a bulwark of economic strength, helping sustain its industry and transportation in the face of wartime difficulties of importing fuel from overseas' sources.

Total 1942 production will be around 3,840,000 metric tons. In 1941, output was 3,499,757 metric tons. Of last year's total, 2,226,800 tons or approximately 64 per cent was government production and 1,272,957 tons or about 36 per cent was private production. This figure exceeded that of the previous year by 223,261 metric tons. While government production increased by 242,548 metric tons, private production decreased 20,287 metric tons. Of the total in 1934 about 35 per cent consisted of national production and 62.53 per cent was private production. In 1941 government production went up to 63.63 per cent and private production fell to 36.37 per cent.

Petroleum production during the first 6 months of 1942, according to Argentine sources, amounted to 1,842,790 metric tons (government controlled production totaled 1,179,790 metric tons, and private output amounted to 663.291 metric tons). These figures compare with 1,692.689 metric tons during the same period of 1941. This increase represents a gain of 8.9 per cent over the previous year. Government-controlled production increased 9 per cent over the first half of 1941, and private output gained 7.6 per cent.

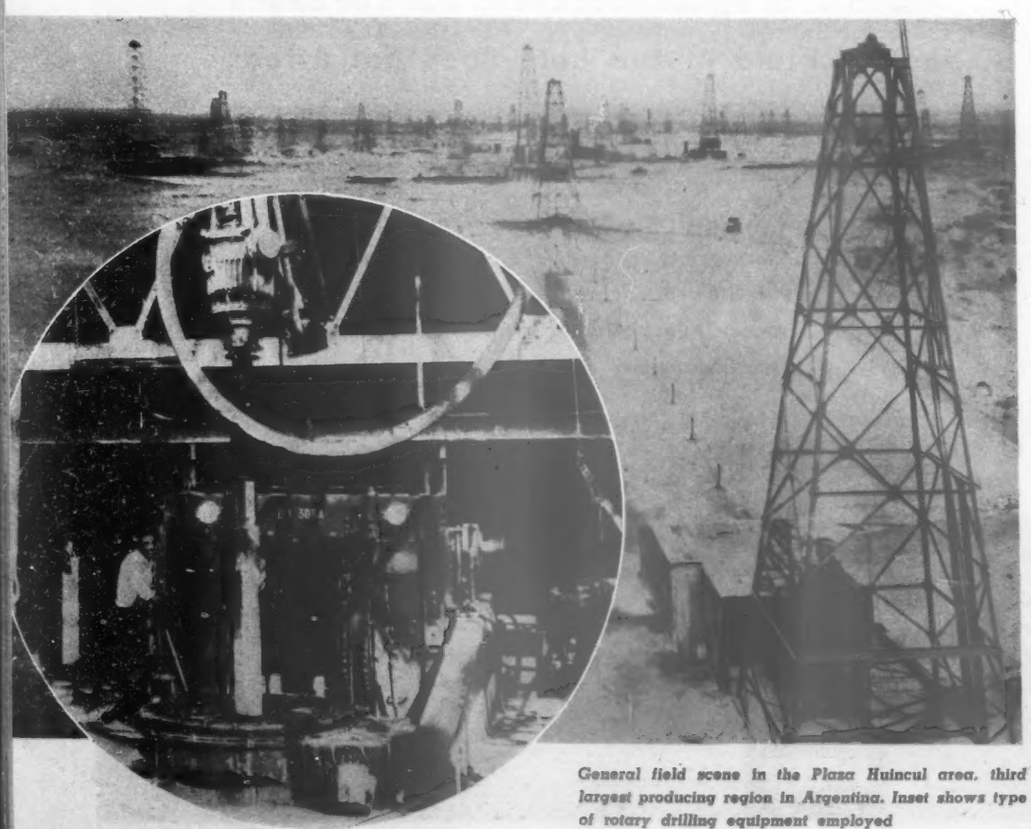
Argentina has more than 3,000 oil producers and approximately 100 gas wells. In 1941 the number of new wells drilled totaled 364. Of this total, 228 were drilled by the government petroleum agency. There are 19 refineries with an annual capacity of some 4,800,000 metric tons. (One metric ton is the equivalent of 6.28 bbl.) Argentina has 31 tankers and the recent acquisition of a 13,500-ton vessel, the San Blas, brings the government's oil fleet tonnage up to about 85,000 tons.

This review of Argentina petroleum operations, explaining significance of the production and refining capacities, was prepared from material supplied by the Office of Coordinator of Inter-American Affairs which is headed by Nelson Rockefeller.

Insufficiency of transportation to move part of Argentina's crude-oil requirements from other South American producing countries makes this year's increased output of particular importance. The increase in production will average about 9 per cent for the year.

Argentina, second in area and population and first in per capita wealth among the 10 South American republics, stands ninth among the oil-producing nations of the world. The countries normally exceeding Argentina in the order of volume of production are the United States, Venezuela, the Soviet Union, Iran, the Netherlands East Indies (prior to Japanese conquest), Rumania, Mexico and Colombia.

Despite relatively large national production, this nation is still compelled to import both crude and refined oil products. Huge quantities of oil are required for a great network of railroads and industries and the largest number of motor vehicles of any of the South American republics. Argentina has 307,935 registered motor vehicles compared with Brazil's 205,722, Chile's 48,000, Colombia's 34,000, Uruguay's 28,823 and Peru's 22,216.



General field scene in the Plaza Huincul area, third largest producing region in Argentina. Inset shows type of rotary drilling equipment employed

Government Controls Oil Production

Argentina has not left its petroleum development entirely in the hands of foreign companies or domestic private enterprise. However, to a considerable extent Argentina has taken advantage of the special skills and abilities of foreign oil experts. And at the same time she has adopted a policy of gradually bringing the oil industry under the control and ownership of the national government.

In 1934 about a third of the oil production came from wells owned by the government while two-thirds came from wells in the hands of private owners. These figures are now sharply reversed—nationally controlled oil wells provided two-thirds of the production with the trend strongly upward—while privately owned oil properties showed a relative decline.

The genesis of the oil industry in Argentina goes back to 1859. While men were digging for water in Chubut, the first oil deposit was accidentally discovered. Thus, Argentina began its first stride on the road to its great petroleum era with the drilling of the so-called Drake well. The government immediately recognized the importance of this discovery and explorations were rapidly expanded to further this new economic development.

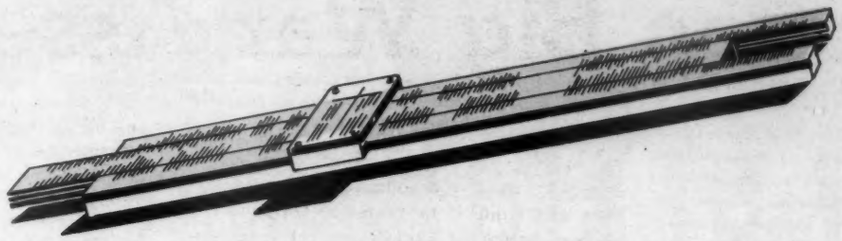
The government soon passed a decree prohibiting all drilling within a radius of 15 miles from the location of the first well in the famous region now known as the Comodoro Rivadavia oil fields in the Province of Chubut.

Argentina soon made haste to reserve the right to control and supervise its source of oil which, with the passage of time, was to become an important factor in the nation's future industrial progress.

By 1923 Argentina was producing at the rate of 2,123,000 metric tons of petroleum annually and had reserves of 34,375 acres in the Comodoro Rivadavia and Plaza Huincul oil regions. From 1916 to the end of 1923 private industry also produced 372,059 metric tons. Private companies filed 7,236 applications for permission to drill, hoping to cover an area of 20,229,000 acres.

Despite the large number of applications, by the end of 1923 the situation indicated that private production represented only 17.5 per cent of national extraction; whereas the government had extracted 1.545 metric tons of oil for each 2½ acres in reserve; private concerns had 55 acres reserved for each metric ton of oil withdrawn.

As a result of these conditions, the government



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in 1924 resolved to extend the reserve zone and at the same time suspended admission of new drilling applications in national territories, whether on government or privately owned lands. It also regulated future transactions in order that mining concessions be granted solely for the purpose of working them to prevent circumventing the aims of the National Mining Code. This measure rendered useless all previous private applications for drilling permits.

However, there still remained to be solved the problem created by the then current practice of selling crude petroleum without refining. It was customary to burn crude oil in boilers of industrial plants, railroads and ships without utilizing the lighter components. To solve this problem the government in 1925 established its own refinery at La Plata. This event marked an important step in the history of the Argentine petroleum industry.

Government Checks Competition

With the establishment of the La Plata refinery the government was thus able to check foreign competition. Foreign companies, faced by a growing national production, had already begun to adopt measures to lower prices and intensify the importation of gasoline. The price of gasoline, which until 1921 had been 35 centavos (Argentine currency) per liter in Buenos Aires, the capital city, fell in 1925 to 25 centavos per liter. One gallon is the equivalent of 3.78 liters. (The Argentine peso equals 100 centavos and is worth about 20 cents U. S. at present.)

Combustible imports, among which gasoline held a leading position, from 1924 to 1929 showed an increase of 80 per cent above the previous 5-year period.

The competition ended 5 years after the government refinery at La Plata was established and the Yacimientos Petroliferos Fiscales—Y.P.F. (Government Petroleum Deposits) was able to meet competition and accordingly lowered the price of its gasoline for the first time late in 1929. Towards the end of the same year Y.P.F. again lowered its price 2 centavos and in February 1930 stabilized its quotations and fixed a uniform price of 20 centavos throughout the nation.

The credit for Argentina's petroleum program during the period between 1922 and 1930 is attributed to Gen. Enrique Mosconi. During this 8-year period General Mosconi managed to obtain an increase in government-petroleum production from about 350,000 metric tons to approximately 900,000.

Imports Taper Off

The highest figure in the importation of foreign liquid combustibles was reached in 1929, with a taxable value of $234,579,000. This figure fell to $62,460,000 in 1933—a decrease of about 70 per cent. In 1939 the import figure rose again to $149,897,656. In 10 years there was a decrease in imports of 36 per cent. Taking the 1932 national production of petroleum as equal to 100, Y.P.F.'s index for 1939 reached 180.13 while private industry totaled only 112.42.

The government soon adopted a legal-protectionist policy regarding its own petroleum interests. This legal policy declared that hydrocarbons, depending upon their location, belonged to the government or was the property of the provinces.

The national territories, representing about 42 per cent of Argentina's land area, were reserved either for government exploration and exploitation, or for joint development by the government and private concerns. About 33 per cent of the land area of the nation was left free to private initiative. Five of the provinces, with approximately 15 per cent of the total area, entrusted exploration and development of their deposits to the official government oil agency.

The Province of Salta reserved a zone equivalent to about 1 per cent of its total area and turned over its geophysical explorations to Y.P.F. The provinces' reserves which were equivalent to 8 per cent, were opened to the initiative of private capital in joint operation with the respective provinces. The government also decided to limit the importation of petroleum and to adopt a system of agreements, designed to retain in its own hands the control of the distribution of gasoline and other products.

The principal oil-producing regions of Argentina, in the order of their production, are at Comodoro Rivadavia, Mendoza, Plaza Huincul, Salta and Jujuy.

The Comodoro Rivadavia oil fields increased production from 1,450,000 metric tons in 1931 to 2,100,000 metric tons in 1940.

Mendoza, the second largest producing region, increased oil production from a little over 100,000 metric tons in 1931 to approximately 450,000 metric tons in 1940. In 1941 the Mendoza oil fields had 51 wells in production with 18 wells in the process of exploration and exploitation. The Mendoza region, which has some of the deepest wells in the country includes one well which was drilled to a depth of 9,500 ft., a record for Argentina.

Plaza Huincul producing wells totaled 274 in 1941 while in Salta there were 157.

Refinery Operations Expanding

In 1939 there were 19 oil refineries in Argentina engaging 4,141 employes who were paid $9,415,000. The cost of materials consumed added up to $136,121,000 and the value of fuel and lubricants consumed was estimated at $7,747,000. Of these 19 refineries, 11 are located near Buenos Aires, one in Mendoza, one in Santa, one in Salta and two each in Chubut and Neuquen.

Of the $171,173,000 worth of products refined, $140,041,000 was processed in the Buenos Aires region and $31,132,000 in the rest of the country.

Ricardo Silveyra, president of Yacimientos Petroliferos Fiscales, Argentina, is an engineer and is credited with building the government oil agency to its present state of efficiency. He has headed the federal petroleum organization since 1931

A recent report in the Argentine Bulletin of Petroleum Information stated that in order to fill its gasoline, kerosene, gas oil, diesel oil and lubricant requirements, Argentina must refine at least 4,000,000 cu. m. of petroleum annually. In 1940 the quantity refined was 3,920,074 metric tons. Of this total, 584,607 metric tons represented petroleum imports. In other words, in 1941, 85.09 per cent was national production and 14.91 per cent was imported.

Together with the production and refining of petroleum, Argentina also produces natural gas. There is an estimated consumption of 850,000,000 cu. m. of processed gas whose heat value is estimated at 9,500 calories per cubic meter. The production of petroleum gas in 1941 represented 94.12 per cent of that year's total consumption, without having to draw upon natural-gas reserves. Exploitation of these reserves is just beginning.

Consumption Rate High

It is estimated that in normal times Argentina, with a population of 13.500,000, consumes 100 l. of gasoline per capita, while the rest of South America, with a population of about 75,000,000, consumes only 16 l. per capita.

The activities of the engineer, Ricardo Silveyra, were closely connected with Argentina's most important petroleum events in the past decade. Senor Silveyra joined Y.P.F. in 1931 and carried through the government's petroleum policy, bringing about an increase in production of 154 per cent and an increase in refining capacity of 158 per cent to date.

Oil imports have been restricted by the war. In some respects the shortage of fuel oil presents a more serious problem than that of gasoline in view of its importance to the industrial life of the nation. The railroads alone consume 1,500,000 tons of fuel oil annually, including diesel and gas oils.

Recently, industrialists have been pressing the Argentina Government to drill new wells in the reserved oil lands to increase national production. Eighty per cent of the oil wells drilled within the last year were in the Chubut region where the Comodoro Rivadavia fields are located.

Should Argentina be able to obtain enough drilling equipment, a great expansion in the number of producing wells may be expected.

Argentina has recently arranged with Bolivia for the delivery of 3,000 tons of oil per day from the Bermejo wells through a pipe line to Argentina. This oil will be refined at the Aguas Blancas refinery.

New Developments

Recently the Argentine legislature considered a proposal to construct alcohol distilleries to manufacture motor fuel from corn, wheat, barley and other vegetable products. This program, if adopted, is intended to furnish a use for surplus corn, as well as the byproducts of the wine and sugar industries. Proponents of this project point out that mixing alcohol with gasoline improves the quality by increasing the octane rating.

The proposal calls for an investment of $24,000,000 in plants with an annual capacity of about 40,000,000 gal. of 99.8° alcohol. A mixture of at least 10 per cent alcohol with gasoline is planned.

The cost of the installation is expected to be met by an increase in the price of gasoline and will be amortized in 2 years.

Another plan now being considered to offset the fuel shortage is an exchange of Argentine gasoline and other petroleum products for Chilean coal. These plans envisage use of vessels of the Argentine merchant fleet to make the exchange.

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WAR PRODUCTION BOARD ORDER NO. M-21-A **prohibits the use of molybdenum as an alloy agent on orders having preference ratings lower than A-1-K and then only after having been approved by Director General of Operations. Certain existing orders of the War Production Board prohibiting the use of various alloys in the manufacture of steels currently used in the manufacture of Well Head Equipment, coupled with the fact that most of our sources of supply are heavily booked with War orders carrying top preference ratings (not available to the Oil Industry) makes it impossible to any longer obtain steel formerly used to fabricate parts going into the manufacture of Well Head Equipment.**

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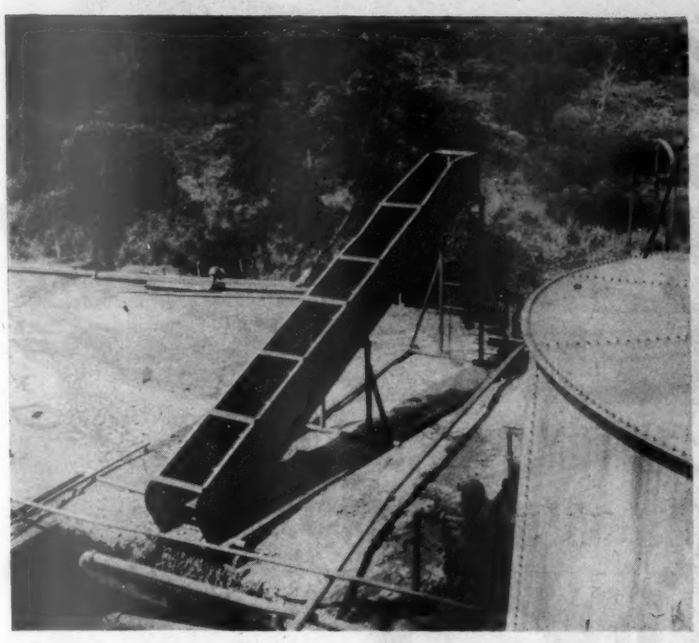

Degassing tower view, from top of 500-bbl. reserve mud tanks. Auxiliary pump at lower right for mixing mud, running mud guns, and circulating over tower

View from 500-bbl. reserve mud tank across suction and settling pit, showing mixing hopper for bentonite, weighting materials, etc., and mud-materials storehouse

Deeper Venezuelan Drilling Poses Special Mud Problems

By FRANK COLAHAN
Mud Engineer, Mene Grande Oil Co., C.A.

IT is well known that there is a wide variation in the conditions pertaining to drilling muds between wells located in different fields, and even between wells located in the same field. In eastern Venezuela most of the methods used in the treatment and handling of mud are similar to the methods used in the United States. However, in Venezuela, both the natural conditions and those artificially imposed, differ in many respects from those in the United States. This paper attempts to point out some of the problems peculiar to this region and to outline the methods used in their solution.

General Operating Practice

An 8-hour day, with a 48-hour week, is the rule, and in certain fields where conditions are favorable drilling operations are suspended during Sundays and holidays. The hole is merely left full of mud, with the drill pipe out and master valve closed. Even though there may be 5,000 to 6,000 ft. of open hole, there is seldom any serious trouble or delay in getting back to bottom after 24-hour shutdowns. If conditions were this favorable in all the fields in the country there would be little work for mud engineers. In the past few years, however, a number of deeper fields have been opened, where conditions are far from favorable, shutdowns of even a few hours mean risking loss of the hole, and relief crews are used to permit 7 days a week operations.

Generally speaking, natural muds from eastern Venezuela fields have better characteristics than the average natural muds in the United States. Filter characteristics are particularly good, water losses as low as 10 cc. in the first 15 minutes (through standard filter press at 100 lb.), are found in natural untreated mud. On the other hand, surface clays which make acceptable mud are rare. In the majority of eastern Venezuela fields, sufficient natural mud is produced during the drilling of a well to complete the well and carry out an extensive testing program. In fields where there is no excessive gas pressure, or the loss of circulation is no problem, wells are usually completed with 2,000 or 3,000 bbl. of excess mud in the reserve pit. The usual procedure when spudding a well is to haul or pump to the well sufficient liquid mud to fill the settling and suction pits. In high-pressure areas, a tank of high-weight mud may be prepared and kept in reserve. This liquid mud is obtained from any nearby drilling well which has an excess. Mud is moved to isolated wells in tank trucks, but in more closely developed areas it is usually pumped through pipe lines. These pipe lines are laid before the well is spudded, and subsequently serve as water or flow lines.

There is a similarity between the formations penetrated in all the fields, which will be discussed later. Most of the section consists of shales with many interbedded sands varying from a few inches to as much as 100 ft. or more in thickness. There are also numerous thin streaks of very hard clay-ironstone.

The usual completion procedure, in all fields, is to set casing close to bottom, through any one of a number of possibly productive sands, gun perforate, and test each sand separately. Protective intermediate casing strings are set in some of the more difficult fields, but this is the exception.

Most Severe Conditions

The most severe drilling conditions, which require use of carefully controlled drilling mud, are found in fields such as Santa Rosa, Santa Ana, San Joaquin, and El Roble, where both high temperatures and pressures are encountered. Well depths range from 6,000 to 11,000 ft. Bottom-hole temperatures of 270° F. have been recorded at 8,500 ft., and the temperature of the mud at the flow line is 145° to 150° F. Further, sands containing high-pressure gas are encountered at comparatively shallow depths. In the Santa Rosa field, in wells near the top of the structure, it is necessary to begin weighting the mud at 4,000 ft. The mud weight is controlled directly by the addition of barytes, and it has been found that mud weights up to 105 lb. per cu. ft. (14 lb. per gal.) are required to hold the higher pressure sands in this area. But the average mud weight while drilling the petroliferous section usually is 95 lb. (12.7 lb. per gal.). The barytes used for this purpose causes the formation of an excessively thick and porous mud wall which causes the bit to hang up in making round trips unless the water loss is kept at a minimum. Hence, in order to prevent dangerously thick wall cake it is absolutely essential to reduce

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the water loss to the lowest possible figure and maintain same at that point. In addition, certain shales appear to be adversely affected by mud with a high water loss, which cause them to sluff when such a mud is used. If the water loss is not kept at a minimum, troubles multiply rapidly. Valuable hours will be lost working the bit through thick mud wall at each sand when pulling out, and more time spent reaming the same tight spots when running in. In addition there may be 20 or 30 ft. of tightly packed shale to clean out of the bottom of the hole, which is particularly undesirable when coring. In these fields, natural untreated mud has a water loss of from 12 to 15 cc. The addition of barytes increases this to approximately 18 cc. By the addition of bentonite, tannates, phosphates, and powdered mica, the water loss can be reduced to, and maintained at 4 to 6 cc. It has been found that both excessively thick mud wall and sluffing shale are practically eliminated when the water loss is kept in the neighborhood of 5 cc., but the maintaining of such a water loss necessitates continuous mud treating. Unusually heavy treating must be maintained because of the large volume of mud made by the hole as drilling progresses.

Water Loss Causes Trouble

The slightest disruption of mud characteristics resulting in an increased water loss immediately causes severe trouble, both from mud wall and shale. Unfortunately, it is much more difficult to readjust mud conditions to a proper water loss than to unbalance same, for instance, a heavy rain causing slight dilution, the loss of a considerable quantity of mud into the formation, or the careless introduction of a few barrels of untreated mud into the system may, in a few hours' time, cause damage to the mud that will take several days of intensive treating to overcome. Mud weight must be maintained carefully at the required point, for in some holes, a margin of 3 to 4 lb. per cu. ft. (approximately 0.4 lb. per gal.) means the difference between lost circulation due to excessive hydrostatic pressure, or a blowout because of insufficient pressure.

It is desirable to carry the viscosity as low as possible to facilitate drilling, but it must be sufficient to maintain the weighting material in suspension, and to prevent the larger pieces of shale and clay-ironstone from settling when circulation stops. There is seldom any trouble in keeping the viscosity up; the usual problem is to keep viscosities low enough to prevent the bit from balling up, especially since water can be used but sparingly because of necessity to keep mud weight high and water loss low. Chemicals for controlling water loss are used freely, and the mud is continuously agitated to prevent gelling, by using mud guns in the suction pit.

Towers Degas Mud

Cooling or degassing towers consisting of varied arrangements of baffles and orifices have been tried for agitating, cooling and degassing the mud. At the present time it seems doubtful if the towers are worth the extra trouble and expense for, if the mud is maintained in proper condition, towers are not essential in this area. An extra mixing pump is desirable to circulate the mud through the guns, which provide a simpler and cleaner substitute for the towers.

The Quiamare area, which is north of the above-mentioned fields, presents entirely different mud problems. This field is located immediately south of the coastal mountains, and the formations show the effect of considerable folding, the shales being slickensided and the sandstones well cemented and abrasive. Gas pressures are not high, and the principal problem is maintaining circulation while drilling the sandstones. When a sandstone bed is penetrated,

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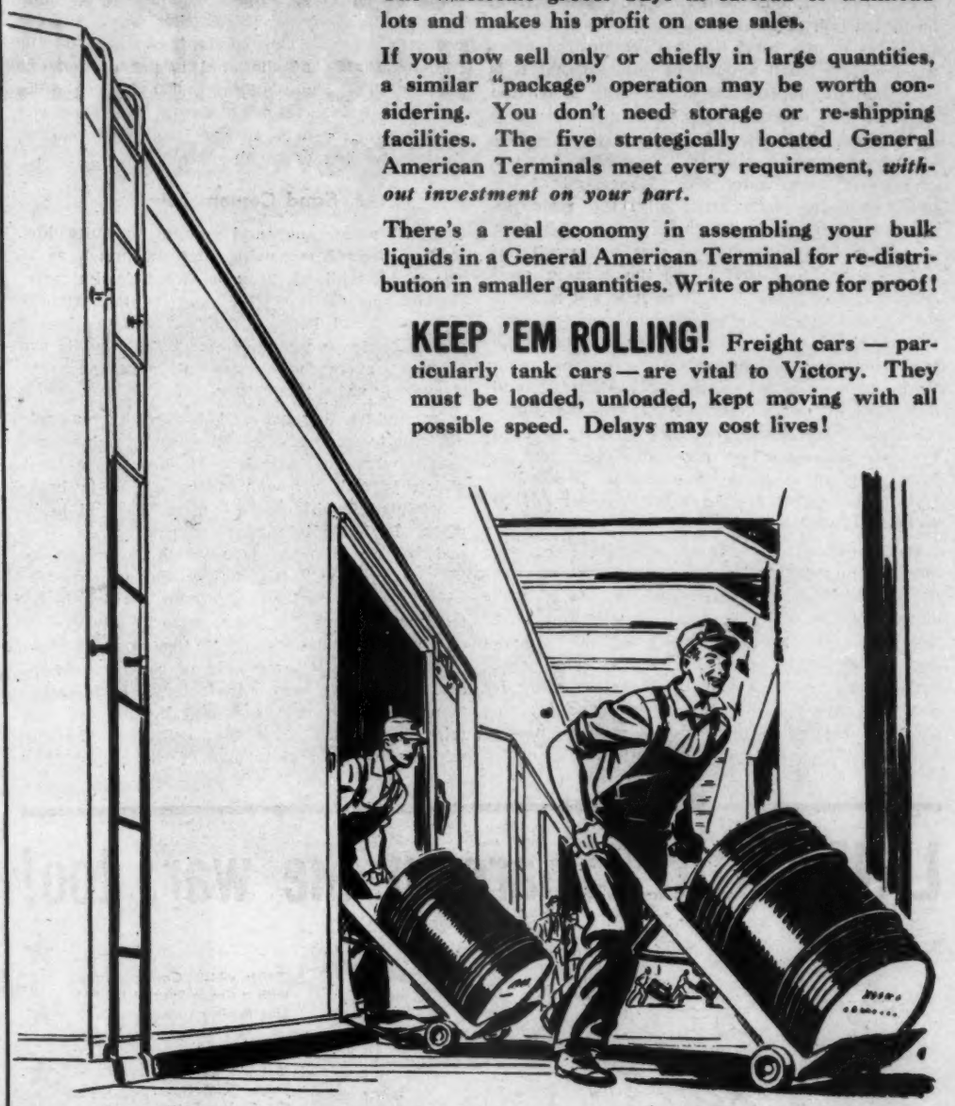

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usually partial and occasionally complete loss of circulation results. However, after pumping slowly for several hours with the bit a few feet from bottom the formation becomes mudded off and drilling may be resumed. Full circulation is returned to the surface until the next sandstone is penetrated. Each time this occurs, from 50 to 400 bbl. of mud disappear. Because of the hardness of the rocks in this section the holes make only a small amount of mud, so that it is necessary to supplant the supply with mud from some outside source. Clays from outcrops have been tried, and rejected. They are very gypsiferous and make a poor quality of mud, with excessively high water loss. Hence, all of the mud must be made artificially, the main ingredients being bentonite and water. This type of mud is well suited to the area because it has a low water loss that keeps the hole in good condition, and a low weight so it is not so readily lost into the formation. It has been the practice to bypass the vibrating screen and circulate fibrous or flaky materials in the mud. While such materials reduce the rapidity of mud loss, they do not eliminate it. Cottonseed hulls, "Gelflake," and powdered mica have been used for this purpose. For minimum mud loss, a fluid weighing no more than 70.5 lb. per cu. ft. (9.4 lb. per gal.), and having a viscosity of 30 seconds (1,500/500) gives the best results.

Wells drilled in the southerly fields, i.e., Oficina, Leona, and Guara, are free from many of the problems enumerated above. There is little danger of either lost circulation or from high gas pressures. Natural, untreated mud, weighing 75 lb. per cu. ft., is, except in rare cases, sufficiently heavy. Usually no mud treating is necessary above 6,000 ft., except on rare occasions in drilling surface hole it may be necessary to add a few sacks of bentonite to overcome lost circulation. Below 6,000 ft., however, it is advisable, and in certain cases, mandatory to reduce the natural water loss of the mud from 13 to 15 cc. to the range of 8 to 10 cc. in order to avoid tight hole. Treatment in this area is simple, and usually consists of the addition of bentonite, with a comparatively small amount of chemical for cutting back the viscosity. Care must be exercised, especially in the rainy season, that the mud is not diluted too greatly. The shales above 4,000 ft. are quite soft, and will cave after several hours contact with water. Such caving has on occasion, caused the loss of much open hole.

Sand Content Low

In all areas, the sand content is quite low. It may become somewhat high (as much as 15 per cent), while drilling surface hole, but after setting surface pipe the sand content rapidly decreases, and below 3,500 ft. is less than 2 per cent. In one other respect the mud is satisfactory everywhere. The salt content rarely, if ever, is more than 150 p.p.m.

As mud-treating materials become increasingly difficult to import, local substitute products are used, when obtainable. Quebracho extract, which is rather costly in Venezuela, is being substituted for in part, by using divi-divi in its place. Divi-divi is made by grinding the seed pods of the divi-divi tree which is indigenous to the country. Divi-divi gives good results when used in wells that do no require heavy treatment. Three or four parts of divi-divi to one part of caustic soda is the most effective mixture. With less amounts of caustic soda the divi-divi is not very satisfactory. It is rather troublesome to use, because the powder contains numerous insoluble cellulose particles which plug the outlet valve of the mixing tank unless the solution is strained. When heavy mud treatment is required, divi-divi is not a satisfactory substitute for quebracho.

Much has been written about the water loss of rotary mud, and to compare this characteristic quantitatively between two or more muds, the measured volume of water expelled from samples of the respective muds through a filter press under a given set of conditions is used. The actual volume of water lost from the mud in an open hole is, obviously, unsuited for comparative work because of the many variables between different holes, but measurements of the volume of water which migrates through the mud cake and into the formation are interesting because they show the scale on which filtration occurs. This volume has been estimated by metering the quantity of water necessary to maintain the mud at a constant weight while circulating. A different method is described below.

Fluid-Loss Characteristics

As was previously mentioned, in the fields where conditions are favorable, drilling operations are suspended on Sundays and holidays. Following the shutdown period, it is only necessary to measure the volume of mud required to fill the hole, to know that an equivalent amount of fluid has been lost into the formation during the previous 24 hours. Such measurements were taken at 15 drilling wells in the Oficina field (after 24-hour shutdown periods). Because of the number and uncertainty of the variable factors involved the fluid losses cannot be expected to adhere closely to any precise mathematical relationship. However, in this field the fluid loss is approximately proportional to the amount of open hole rather than to the hydrostatic pressure. About 50 cu. ft. of fluid were lost per 1,000 ft. of open hole. The bit size used in drilling the wells in question was either 9½ or 9⅞ in., and approximately 1,000 ft. of 10¾-in. casing had been set in each well. The mud, in all the wells, had similar characteristics at equal depths. At a later date, caliper logs made in several Oficina wells indicate the true volume of uncased holes is about twice the theoretical volume. Assuming this to be the case in the wells in which loss in mud volume was measured, about 5½ per cent, by volume, of the fluid in the open hole was lost in the formation. The evidence indicates that all the fluid lost was the water phase of the mud, and not the mud itself, for during the 24-hour period the mud weight rose from 75 to 81 lb. per cu. ft. and the water phase of the mud was reduced from 72 to 62 per cent. With such a radical change in the composition of the mud it is amazing that seldom is there any trouble from either sluffing shale or thick mud wall at the end of the shutdown period, nor from reduced pressure resulting from the lowered fluid level. In one well the mud level fell 460 ft. The hydrostatic pressure at the casing shoe was reduced some 265 lb. per sq. in. thereby. As can be surmised, the practice of suspending drilling operations without keeping the hole full would not be feasible if any high-pressure sands were present.

Sufficient wells have been drilled in the different fields of this region so that the basic problems are well known. While these problems have been solved within the limits of the materials available for mud treating, it is anticipated that in the future new and better methods and reagents will be evolved. At present, work is being done with gums and starches for more efficient reduction of water loss, and while the experiments show promise, the materials are not yet ready for field use with fresh water muds. But no matter how effective are the reagents which may be developed, the mud, in some of the fields, will always require close supervision and the mud costs will never be low.

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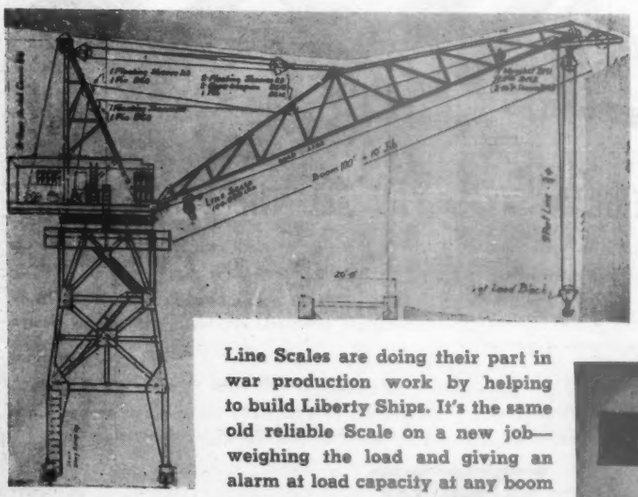

(Left): 40-ton Gantry Crane with a Crane Special 100,000 Line Scale on dead line.

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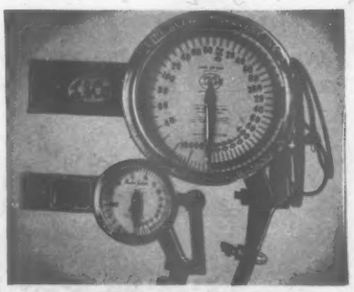

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PAW Foreign Division Juggling Supplies to Minimize Dislocation

By JAMES TERRY DUCE
Director, Foreign Division, Petroleum Administration for War

EARLY in 1941, it became clear that the great problem of the war, as far as supply and distribution of petroleum and petroleum products was concerned, was that of transporting them to centers of consumption. We had ample supplies of these products but due to the exigencies of the war, which had been going on for some time, we found ourselves quite short of the means of moving them to the markets, especially to foreign markets. It was for that reason that one of first recommendations issued by the then petroleum coordinator (now petroleum administrator) was Recommendation 2 of July 24, 1941, recommending that the companies engaged in supplying markets in the Caribbean area, except Cuba, discontinue supplying these markets from the continental United States and that, instead, they supply them from nearest sources, thus shortening the haul and economizing in the use of tanker tonnage. This was followed shortly by Recommendation 9 of August 26, 1941, addressed to the "Petroleum Supply Committee for Latin America," previously appointed by the petroleum administrator, and to the various oil companies engaged in the marketing of petroleum and petroleum products in Latin America. Over the signature of Deputy Petroleum Administrator Ralph K. Davies, it was recommended that in view of the acute shortage of tonnage in the Western Hemisphere resulting from diversion of part of the American tanker fleet for national-defense purposes, said companies and their subsidiaries do the following:

Tanker Space Allocated

1. Devise and submit to the chief counsel of the Office of the Petroleum Administration for War, and, after its approval in writing by said chief counsel, put into effect a plan to release or procure and so allocate among themselves and among the national and local companies which distribute petroleum products in the other American republics, sufficient tanker space which, when added to or subtracted from that space otherwise available to such national and local companies, shall result in a curtailment of deliveries of petroleum products, to each such republic and to each company distributing petroleum products in each such republic, approximately equal to that necessary at seaboard points in the United States where a shortage of tanker transportation facilities results in curtailment of deliveries of petroleum or its products.

2. Utilize available tankers so as to haul petroleum and petroleum products from the points of supply nearest the markets to be served and in such manner as to avoid multiple port loading and discharging, crosshauling, and unnecessary ballast voyages.

3. Utilize all barge, terminal and storage facilities in such a way and without regard to individual ownership of such facilities as to reduce to an absolute minimum idle time in port and the splitting of cargoes between two or more ports of discharge.

4. Arrange for the exchange or loan of products among themselves whenever and to whatever extent may be necessary to facilitate the reduction of the tanker tonnage required to transport the required petroleum products to the aforesaid American republics.

5. Consult (the committee and the companies) with the State Department and the United States missions in the various American republics on matters of policy, particularly matters affecting relations with the Latin-American governments or companies, and cooperate with such local committees as may be appointed in each of the countries concerned in order to coordinate their local activities with the governmental policies of each such country.

This Petroleum Supply Committee for Latin America, acting as an industry committee under the direct supervision of the Foreign Division of the Petroleum Administration for War, has been actively engaged in the task assigned to it under the above-mentioned recommendation and the "Tanker Allocation Plan for South America" submitted and approved thereunder. In doing so, it has asked and received the close cooperation of the companies involved and of the various local "pool committees" organized in each country in accordance with this recommendation. The authority of these local committees is, of course, dependent upon the laws of each country and the wishes of the local governments. In some countries, they work directly with the governmental authorities; in others, they act merely in an advisory capacity in the extremely difficult job of apportioning available supplies among the various local marketers in such a manner that the burdens imposed by the vicissitudes of war might fall equally upon all concerned.

As long as available supplies in each country were equal or approximately equal to demand, the task of the local committees in distributing the products and of the Petroleum Supply Committee in scheduling shipments, was comparatively easy. After Pearl Harbor, however, and the resulting raids of enemy submarines on our shipping, it soon became apparent that there were just not enough ships to go around. The State Department, in line with our Good Neighbor policy, made it known that the other American republics should not sustain an unfair or disproportionate curtailment of petroleum supplies and since this applies particularly to oil shipped in bulk and there is an acute shortage of tankers, it has been a difficult task to determine to what extent the demands of these countries can be satisfied. For instance, in May of this year, civilian supplies in these countries were scheduled on the basis of 85 per cent of their 1941 consumption; in June this percentage was lowered to 66⅔ per cent and, finally, in October it had to be reduced to 40 per cent of 1941 consumption figures. In addition to the decrease in the number of tankers available, this continuous downward revision of percentages was due to several reasons. As military and naval activities increased, their requirements, which must be supplied 100 per cent, also increased, and to these were added the 100 per cent requirements of war-essential industries in these different countries, such as copper, tin and nitrate.

Foreign Requirements Studied

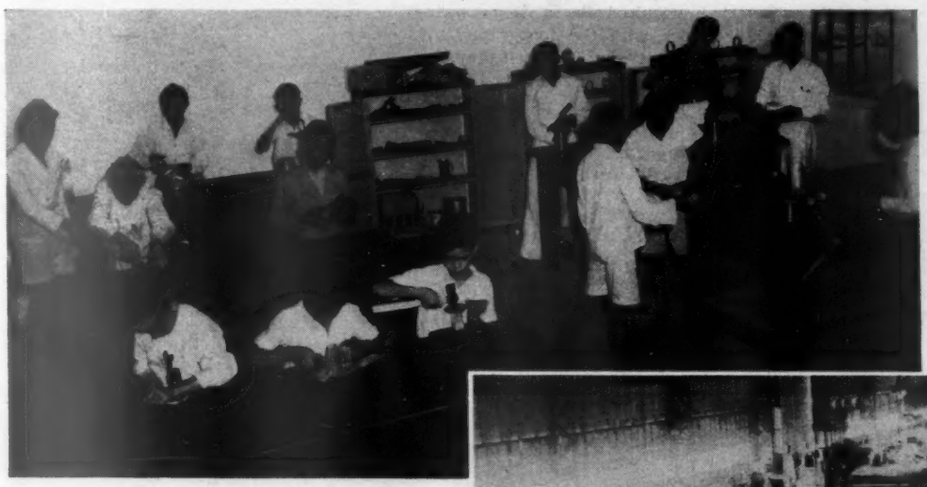
In addition to the help it receives from the local committees and the companies in each country, the Petroleum Supply Committee for Latin America, has the benefit of the advice and cooperation of the Essential Requirements Subcommittee, which was created by the Foreign Petroleum Policy Committee for the purpose of receiving and passing on petroleum requirements for the production in foreign countries of war materials. The Foreign Petroleum Policy Committee is composed of representatives from the State Department, Petroleum Administration for War, Board of Economic Warfare, and War Production Board. The Supply Committee also examines and passes upon the economic requirements in different Latin-American countries dependent upon petroleum supplies, receives information through

(Continued on Page 82)

Foreign exploratory and producing operations of the Texas Co. and affiliated concerns had been the special concern of James Terry Duce for several years before he joined the staff of the Petroleum Administration for War as director of the Foreign Division. Immediately before accepting government duties, he was vice president of the California Arabian Standard Oil Co., jointly owned by Texas Co. and Standard Oil Co. of California. Mr. Duce was born in Worcester, England, came to this country as a youth and graduated from the University of Colorado in 1915 with a degree in geology. Before joining Texas Co. in 1919, he did geological work for the Colorado Geological Survey and the Bureau of Mines.

Training Programs Touch All Phases of Operations

WHEN, one day last winter, a car driven by a South American student at the University of Texas skidded on a glazed road in Louisiana, the resultant crackup touched off a considerable volume of correspondence and interoffice memos in the headquarters of the Standard Oil Co. (New Jersey) in New York City. The motorist sustained a broken collar bone which might prevent his taking examinations impending at the university, and this possible scholastic misfortune was of concern to the Jersey company.



The youth who figured in this geographically scrambled incident was not unique in having a major North American corporation anxious about his health and rate of academic progress. He was simply one of scores of bright young men whom Standard Oil has brought from sister republics in the past few years to study in the United States and to take some of our industrial methods back to their native lands for the greater development of the world's oil wealth.

Today there are approximately 30 South Americans (not all of them university students) receiving scientific or trade education in the United States financed wholly or in part by Standard Oil of New Jersey.

The company's Latin-American educational program began as a matter of business expediency, of developing a supply of competent personnel; it was given impetus by the adoption in several southern nations of legislation such as the Venezuelan statute providing that every foreign corporation give scholarships to three Venezuelans; and it has been carried far beyond statute requirements as a policy of enlightened management.

Standard Oil's educational activities may be divided into three main categories: academic study for young men who do not have a history of long association with the company; practical, but less formal, training of men who have won executive or semiexecutive posts in the company's South American operations and who are brought here to broaden their experience and contacts; and job training of employes who are given regular, carefully prepared instruction while remaining in their South American locations.

The division listed first above was not first in point of time. It has been under way since 1937. Under this part of the program, students are selected by personnel officers of the company in South America, in consultation with representatives of the national governments and institutions of higher learning.

Aptitude Guides Courses

A selected student is employed by the company in operations in his native country for several months. If he shows proper interest and application during that period, he is brought to the United States and enrolled in a university where his courses are selected on the basis of his aptitudes and of Standard's personnel requirements in the student's country.

(Continued on Page 84)

Training for skilled tasks starts in elementary schools sponsored by oil companies. Venezuelan youths are shown here working in a tinsmithing class. Company operated machine shops, such as pictured in the center, afford an outlet for talents acquired by training and experience. Men with special aptitudes are brought to the United States for advanced studies. A group studying at New York universities is shown below on a recent visit to Standard Oil Co. of New Jersey's Bayway, N. J., refinery. In the semicircle, lower row, are: Moorisea Le Roy, Haiti; Ernitque Navas, Nicaragua; Forbes Grant, Argentina; Ambrosio Alliende, Chile; Eladio Martinez, Paraguay; Julio Pazmino, Ecuador; Marco Tulio Camales, Honduras, and Luciano da Ponte, Brazil. In the back row are: Alvin Marks, Henry Wilson, D. L. Ferguson, and George H. White, all Standard of New Jersey men

Slim-Hole Rigs Used in Drilling New Challaco Field, Argentina

DEVELOPMENT work in one of Argentina's most promising new oil-producing areas is being carried on with portable, slim-hole drilling outfits. This is the Challaco area in the Province of Neuquen, 12 miles east of Argentina's second oldest field, Plaza Huincul, and about 800 miles southwest of Buenos Aires. In September of this year, Challaco had seven producing wells, five flowing and two pumping, and four were drilling.

Challaco, like most producing regions, has its own individual problems. The soil, vegetation, and general topography of the region are similar to the southwestern sections of the United States. Like neighboring Plaza Huincul, where new producing areas have been opened in recent years, and more southerly Comodoro Rivadavia, where Argentine's first oil was discovered, it is barren and windswept and almost devoid of fresh water. The discovery of oil was a real disappointment to the settlers of Patagonia who were drilling for water. The lack of water at Challaco is one of the reasons why engine-powered rigs are used instead of steam.

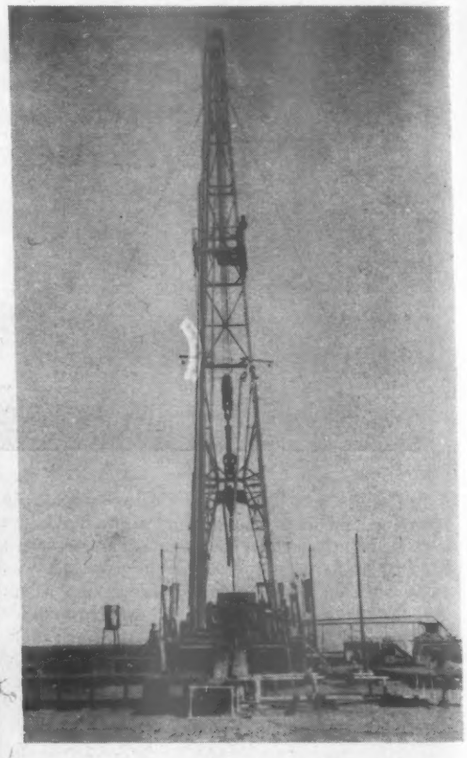
Challaco differs considerably from the Salta fields of northern Argentina which is semitropical, abounding in vegetation and water. Salta, close to the Bolivian border, is also mountainous and the fields are scattered. There is more of a parallel between Challaco and Mendoza in the western part of the country which was also originally barren and arid land.

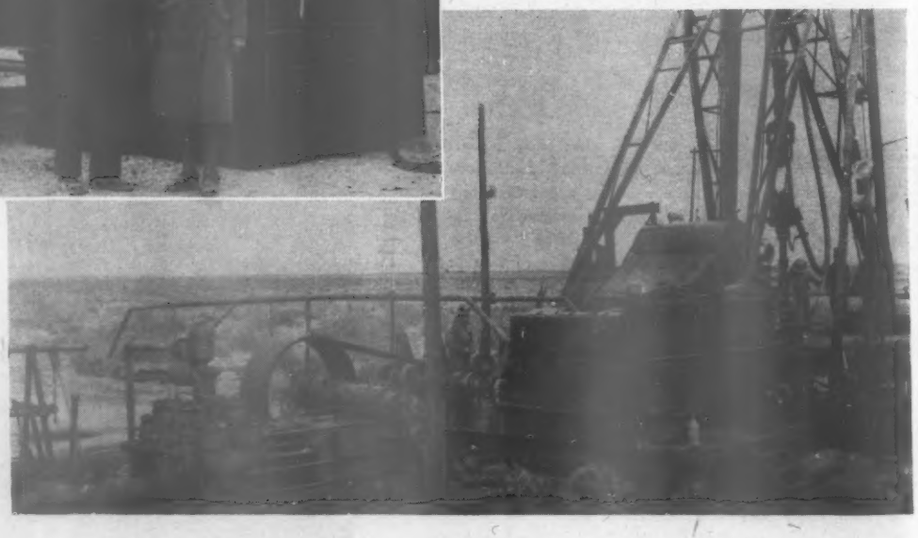
The drilling depth at Challaco is approximately 3,300 ft. and the average total elapsed time from rigging up to the production of oil is 40 days. Customary practice is to cement a string of 13⅜-in. surface casing to a depth of 265 ft. Approximately 72 hours is allowed for the cement to set. The production string normally consists of 7-in. casing. The time required for setting up these portable rigs varies with the topography but in most instances in the region in which they are now being used the maximum is 12 hours. This includes setting up the derrick, placing all units in alignment and starting operations. Because no steam rigs have been used in this area, a comparison with the portable rigs is not possible.

Two Identical Units

Both of the portable units in regular service are identical in every respect. They are Type "ES," the E indicating their 7,000-ft. capacity and the S indicating that they are equipped with a sand reel. They have four speeds hoisting and four rotating. Speed variations are obtained through chain-driven transmission equipped with jaw clutches. The transmission operates in a totally enclosed, sprayed-oil transmission box. Each clutch is engaged and disengaged by an individual air cylinder and a positive-locking device is provided to prevent any two clutches being engaged simultaneously.

A novel feature built into these units and covered by Lucey patents is the reversing pulley which receives the power input from two Cum-





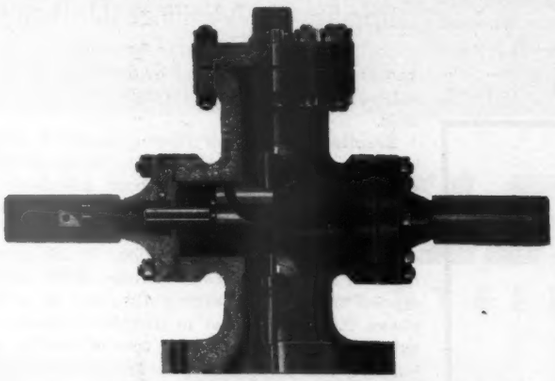
Above: Sr. Sasarea-Cano, Y.P.F. superintendent in the Tupungato field, Argentina, and Dr. Clara de Compano, geologist for the government oil agency

Upper right: Type of mast and pipe racks installed on location in the Challaco field

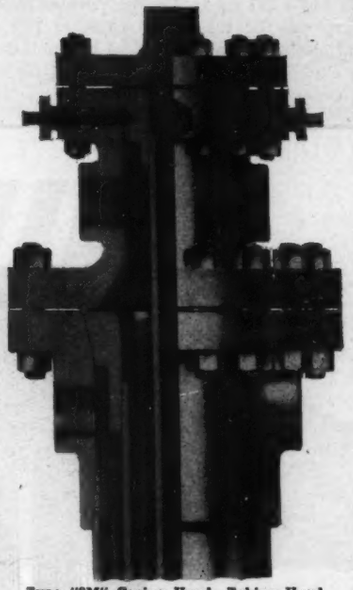
Lower right: Close-up of mud pump, drilling engines, hoist and power side of the slim-hole rig. Standard production derricks, dimly visible in the background, are erected over completed wells

SAFE, PRACTICAL SURFACE CONTROL

For Medium to Highest Pressures....For Medium to Longest Pipe Programs



Round Ram Type Tubing Head for suspending tubing on the rams or on mandrel or slips in the bowl above the rams.

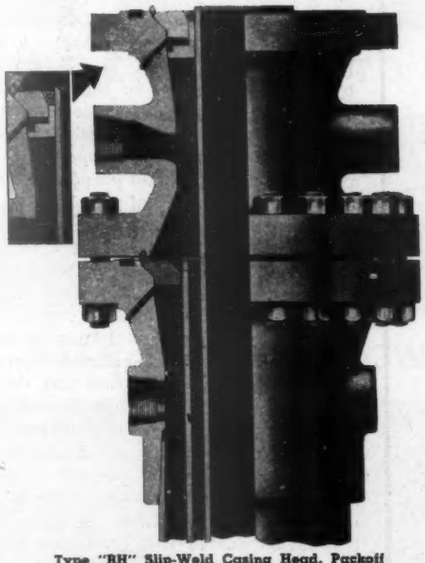


Type "9M" Casing Head—Tubing Head hookup, furnished either with or without locking screws.

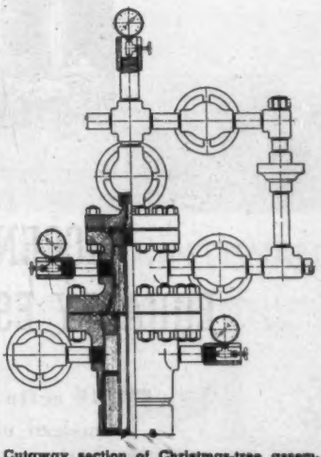
Rector Casing Head—Tubing Head combinations are available for any depth . . . . any pressure . . . . wells. Our 12 years of experience can help you to select the proper combination to meet your specific requirements. The combination shown at left (slip suspension) and that shown at right (mandrel suspension) are just two of the many exclusive designs developed by Rector to meet exacting field conditions.

All Rector units and assemblies . . . . for 1,000, 2,000, 3,000 or 5,000 pound working pressures . . . . are tested in accordance with the Code of Standard of the Association of Well Head Equipment Manufacturers. Your Composite Catalog, or your Drilling Equipment Directory, describes and illustrates this complete line.

RECTOR WELL EQUIPMENT CO., INC.
Fort Worth, Texas
Representatives in All Active Areas
Export Office:
Lucey Export Corp., Woolworth Bldg., New York, N. Y.



Type "RH" Slip-Weld Casing Head. Packoff between slips and weld provides auxiliary seal permitting pressure test of the weld.



Cutaway section of Christmas-tree assembled on "9M" heads, either welded or threaded casing hanger furnished.

The Best Leak Preventer in the Oil Country

RECTORSEAL is an especially prepared material for the treatment of threads and gaskets against leaks, developed specifically for oil industry connections. It is not a petroleum base . . . . it is insoluble in all petroleum products. It lubricates when making up the connection, then seals indefinitely . . . . yet will not "freeze" nor gall the thread, and permits easy break-out of joint. Available from your Supply Dealer in ¼-pint to 1-gallon size handy containers.

RECTORSEAL
THE POSITIVE LEAK PREVENTER

mins LI-600, 200-hp. diesel engines. It is a 15-D groove by 38-in. diameter pulley into which is built a double-disk friction clutch for forward movement and a set of differential gears through which the reversing movement of the shaft is obtained. The sheave is mounted on the shaft. A neutral brake is also included for the purpose of bringing the shaft to a dead stop and thereby facilitating the shifting of the clutches to obtain the desired speed ratio. The reversal of drive is accomplished by air cylinders controlled through valves actuated by lateral movement of the combined throttle and reverse rod.

The rotary drive is obtained through a double-disk friction clutch mounted on an intermediate shaft. Four rotary speeds are obtainable ranging from 59 to 227 r.p.m. for the normal revolutions per minute of the diesel engines. The bailing drum also has four speeds and a double-disk friction clutch is used for engaging and disengaging this drum with the cathead shaft.

Another novel feature is the water-cooled brake bands. The brake lagging is attached securely to the brake drums and the water is circulated through the bands. This is a departure from the conventional manner of cooling brakes and has proved very successful.

The two engines have a compounding arrangement by means of which they may be used simultaneously in drilling and hoisting. It also permits them to be used selectively when drilling, that is, with one engine driving the rotary while the other drives the pump. In an emergency either engine can be cut out for repairs while the drilling operation is carried on.

Both of these ES units consist of the following equipment: Lucey-Wheland "ES" draw works, two Cummins LI-600 engines, one Wheland HP-11500, 7½ by 14-in. power pump, one Wheland hi-speed 17½-in. rotary, one three-sheave, 100-ton traveling block, one Wheland E-6000 swivel and one Lee C. Moore 90-ft., jack-knife derrick. In aggregate this equipment comprises a unit which is highly portable and requires only four loads for moving.

The draw works weighs 22,500 lb., and is transported as one unit. The pump also weighs 22,500 lb. and is transported with the rotary, swivel, standpipe and such other pieces as tongs, etc., in one load. The engines, complete with their Allis-Chalmers Texrope drives, are mounted on a set of skids and constitute the third load. The fourth is the derrick with traveling block and hook.

●

PAW Foreign Division Juggling Supplies to Minimize Dislocation

(Continued from Page 76)

the American missions and its decisions are transmitted to these countries through diplomatic channels.

Despite the efforts of these committees, supply conditions have been subjected to numerous irregularities. Interruptions of boat schedules by enemy action and Army and Navy requirements have resulted in short supply positions, for instance, in Brazil and Puerto Rico. At the present time all South American countries, with the exception of producers, are tightly rationed, and in places this has resulted in complete cessation of automobile traffic except for cars of doctors, ambulances and government vehicles. These conditions are gradually being remedied on the basis of equality of sacrifice.

As the convoy systems are improved, what petroleum we are able to move to these countries will be moved in such a way as to spread the supply as equally as possible. The convoy system is, of course, handled by the Navy and through the Army-Navy Petroleum Board.

In a world at war, the supply situation in a particular area may be very seriously affected by supply difficulties on the other side of the world. An important instance of this has been the situation on the eastern seaboard of the United States where events in Europe and Africa have resulted, for all practical purposes, in a complete cessation of movement of petroleum products into that area by tanker. It may be recalled that only a year ago 1,418,000 bbl. of oil were moved into this area by tanker every day. With the diversion of these tankers to other services, however, the eastern seaboard has had to depend more and more upon the overland transportation system, which has required an enormous increase in the use of barges and tank cars and the construction of new pipe lines. Tank-car movement into the eastern United States in 1941 was very small, ranging from practically no shipments in spring to a peak of 141,000 bbl. per day in October and dropping back to 56,000 bbl. daily in December when some tankers were returned. Tank-car movements during 1942 have been increased to approximately 800,000 bbl. per day. Upon the recommendation of the Petroleum Administration for War, the War Production Board recently authorized the construction of a new pipe line into the eastern North Atlantic ports and it is estimated that this will result in releasing for use on other routes a fleet of approximately 80 tankers.

While it is not probable that this fleet will add to the boats already engaged in the South American trade, it is hoped that it will at least prevent withdrawals from this trade, so that the supply situation in these Latin-American countries will not grow worse. It is also to be pointed out that when the various Latin-American countries, which are involved in these very short supply positions have all been informed of the situation, they have extended full cooperation and all of them, except those producing countries which have ample supplies, have applied strict rationing regulations within their territories.

ACCENT IS ON SPEED
EQUALLY ESSENTIAL IS...QUALITY

THE refinements and complications of modern mechanism—for peace or war—make it essential that products be of a known and constant quality. In no other single point in processing is such constant quality so definitely determined as in your heater—it is the heart of your whole operation. Alcorn has eighteen years' heater experience available to you.

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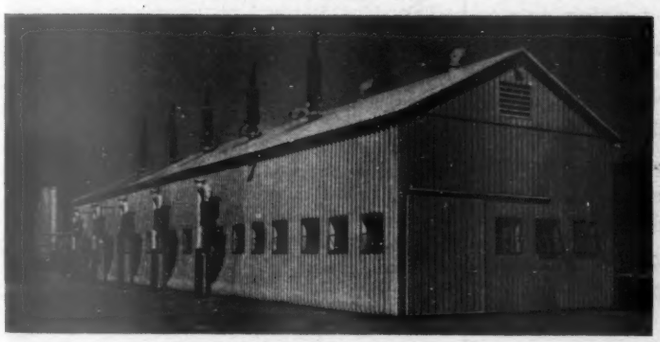
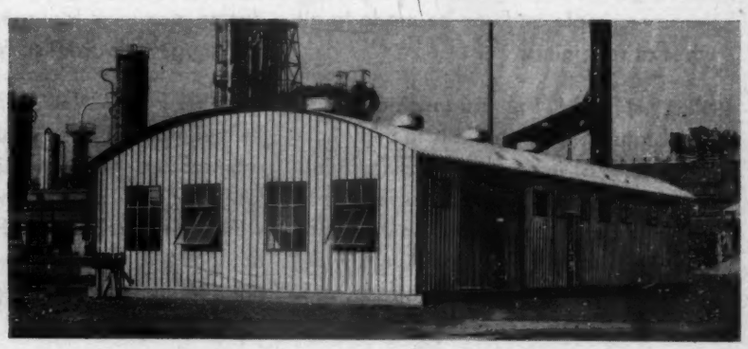
SCHAFF BLDG., PHILADELPHIA
LOS ANGELES HOUSTON SAN FRANCISCO

BUTLER BUILT

STEEL BUILDINGS

COMPLETE, READY TO ERECT QUICKLY WITH UNSKILLED LABOR

FIRE-SAFE, DURABLE, LOW IN FIRST COST, ERECTION AND MAINTENANCE

From what it is called upon to send, the Petroleum Industry well knows that the best of everything goes to war. So it is that the Butler Steel Buildings, upon which the industry has relied for more than 25 years, are on leave of absence. In the form of airdrome and combat hangars, warehouses, machine shops and military barracks they have been and are still marching to war. Along with Butler steel runways and refueling truck and trailer tank units they are playing what is proving to be a vital role in modern warfare. In helping to bring our tremendous and growing air force speedily to bear upon the destruction of enemies, they are speeding the day when the war-sharpened skill of Butler metal-crafters will shape improved designs to better serve Oil Industry needs.

BUTLER MANUFACTURING COMPANY

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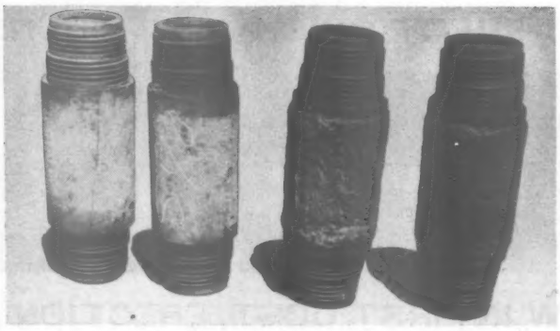
SEE OUR CATALOG IN SWEET'S

Abrasion on Drilling Equipment Can Be Checked by Fortifying the Surface of Wearing Parts With STOODY HARD-FACING ALLOYS



TOOL JOINTS: Constant battering against the abrasive walls of the hole greatly reduces the life of tool joints . . . weakens the string . . . and can cause expensive delays for replacements. But tool joint life is *doubled* or more by applying Stoody Self-Hardening or Electric Tube Borium over the wearing surfaces. The applications are simple and can be made to all types of tool joints.

DRILLING BITS: Standard procedure for obtaining long bit life is to inlay Borium Inserts at important wearing points and to overlay the entire surface with Tube Borium. Because of their diamond-like hardness these Stoody Alloys repel abrasion thereby increasing bit life, producing maximum footage, maintaining a full gauge hole from surface to oil zone.

OTHER APPLICATIONS: Other oil field equipment such as mud pump valves, reamers and mills, wash pipes, etc., which lose efficiency or usefulness because of wear, can be rebuilt and hard-faced with a Stoody Alloy to last from two to ten times longer than a new part.

STOODY COMPANY, 1134 WEST SLAUSON AVENUE, WHITTIER, CALIFORNIA

Training Programs Touch all Phases of Operations

(Continued from Page 79)

His tuition and laboratory fees are paid by the company, and he receives a modest living allowance. In addition, a lump sum is put at his disposal on arrival here, primarily to buy the heavy clothing which is likely to be lacking from his wardrobe.

Standard maintains close relations with the administrations of several universities here and decides where to send a particular student on the basis of the excellence of a school's curriculum in a special field.

At present there are 10 students in the United States under the full scholarship plan. A young Peruvian is studying petroleum engineering at the University of Texas. A compatriot of his and an Argentinian take chemical engineering at M.I.T. Also at Texas are two Venezuelans enrolled, one in civil engineering and the other in petroleum engineering. Four more Venezuelans are at the University of Oklahoma. Of the latter, two did not come to the United States under Standard's sponsorship but, entering the university as regular students, came to Standard's attention because of excellence in studies and were granted scholarships at the end of their sophomore year.

Some of the students are enrolled for 1-year courses, others for 2 years, depending on the education they received at home. The 2-year men are given jobs in Standard of New Jersey plants or producing fields during the summer vacation and therefore remain in the United States during the entire scholarship period.

Physicians Also Given Opportunity

Besides the engineering students, physicians are given opportunity for United States study. These are usually young men who have received their medical degrees from South American institutions and who have served the equivalent of an interneship in one of the company's medical centers, of which 10 are maintained in Venezuela alone, ranging from a 94-bed unit at Carapito to single-bed dispensary units at field camps.

The chiefs of the hospitals select the South American nationals for study here in some specialty such as tropical diseases, public health, etc. Three medical students, all Venezuelans, are currently at Tulane.

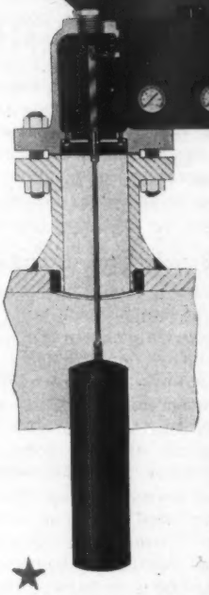
As a collateral activity of its program of full scholarships, Standard participates in other projects for inter-American education. In cooperation with the Mayor's Committee for South American Scholarships in New York, it contributes to the educational expenses of two university students—a Brazilian studying chemistry with special reference to vegetable oils, and an Argentinian studying civil engineering with emphasis on low-cost housing. The company also shares in the Inter-American Trade Scholarship plan set up by Nelson Rockefeller's office in Washington. This, as the name suggests, is for applied trade training rather than academic study, and under this arrangement a young Brazilian is learning North American methods at a Standard refinery and a youth from Mexico is in one of Standard's production operations.

Toward the students it brings here, Standard maintains an almost parental attitude. It asks that the young men keep up good scholastic and deportment records.

Ultimate value of the program, of course, will be measured in the capability of the students when, having returned home, they become business and professional leaders in their own countries. Here Standard feels it is building well, not only for its own future but for future hemisphere relations in general.

WHAT RANGE OF LEVEL CONTROL DO YOU REQUIRE?

LEVEL-TROLS PROVIDE A RANGE FROM 1/2 INCH TO 10 FEET

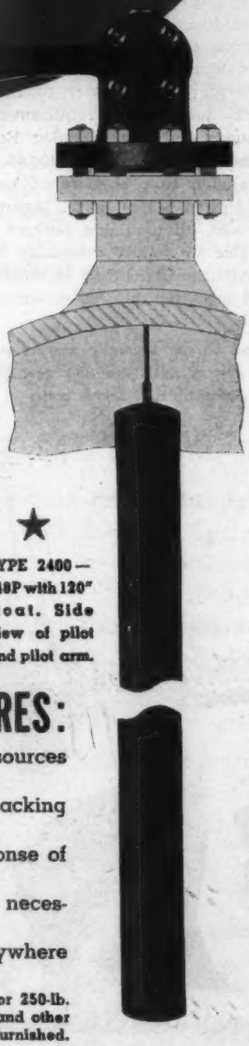


TYPE 2400 — 248P with 14" float. Front view of pilot.

Fisher Type 2400—248P Internal Type Level-Trol makes possible accurate and dependable level control or indication over a range hitherto impossible with float cage and internal ball float type controllers. Tubular float operates on principle of weight measurement of displacement rather than float movement — float moves only relatively small distance in proportion to level change. Floats available in various lengths from 14" to 120" as specified. Pneumatic relay type pilot is full throttling. Suitable for all liquids of all specific gravities at all pressures and temperatures.

LEVEL-TROL APPLICATIONS:

1. Pneumatic Level Controller actuating a remotely installed diaphragm motor valve.
2. Pneumatic Level Indicator actuating a remotely installed indicating gauge.
3. Pneumatic Level Recorder actuating a remotely installed recording instrument.
4. Combination Controller-Indicator, Controller-Recorder, or Indicator-Recorder.



TYPE 2400 — 248P with 120" float. Side view of pilot and pilot arm.

LEVEL-TROL CONSTRUCTION AND OPERATING FEATURES:

1. Extremely sensitive . . . no measurable lag — linkage pivot points and other sources of friction eliminated.
2. Trouble-free operation . . . torque tube construction eliminates stuffing box, packing and lubricator.
3. Quick response to level change — intermittent bleed pilot relay speeds response of diaphragm valve or instrument to level change.
4. Throttling range adjustment makes possible a wide variation in level change necessary to actuate valve or instrument.
5. Level position adjustment permits operator to maintain liquid level range anywhere within the length of the float.

Regularly furnished with auxiliary operating medium regulator and filter. Equipped with 4" 125-lb. or 250-lb. high-tensile iron or 4" 150-lb., 300-lb., 400-lb. or 600-lb. cast steel mounting flange. Type 2400 — 248P and other Level-Trol Types for all service applications are described and illustrated in Bulletin F-1. Copies gladly furnished on request.

FISHER GOVERNOR COMPANY
• 246 FISHER BUILDING •
MARSHALLTOWN, IOWA

Tanker Interruptions React Against All Oil Operations

By J. P. O'DONNELL

BECAUSE of the vast distances that separate the world's producing areas from consuming centers, the matter of transportation is a fundamental consideration for the oil industry. In most instances the principal producing areas and the principal consuming areas are separated by one or more of the seven seas so that tankers constitute the principal method of transportation.

Since tankers are of such fundamental importance to the oil industry, it follows that the effects of the war on tanker transportation have been reflected in virtually all phases of operations. Until the winter of 1940-41 there was ample tanker capacity to meet the requirements of all neutral countries and nonblockaded Europe. At one time in the late summer of 1940, so much tonnage was available that a score of tankers were tied up in United States ports. During the winter that followed, all available tankers were pressed into service to supply unusually heavy demands of the Atlantic Coast area of the United States and a tight condition developed. Since then this condition has grown increasingly acute and prospects of adequate relief are distant.

Up to January 1, 1941, known tanker losses had been 68 vessels of 775,000 gross tons. At that time the world-tanker fleet consisted of 1,535 vessels, representing 10,995,000 tons, approximately 20 per cent of all seagoing merchant ship tonnage. There still were hundreds of tankers at the command of the United Kingdom which was still being supplied in some part of its oil requirements from distant Abadan at the head of the Persian Gulf. By mid-1941 the situation had so changed that Great Britain had to call on the United States for aid and during the latter half of the year an equivalent of 80 tankers (800,000 tons) was assigned to aid the British. The United States entrance into the war was accompanied by a concentration of submarine warfare off the East Coast of North and South America. What the tanker losses in this area have been is not known.

Russian tankers and barges normally moving most of western Russia's oil requirements up the Volga River from the Caspian port of Baku are now restricted, requiring deliveries over longer shipping routes into the Leningrad area in American and British boats

Sovfoto

But if they have been in proportion to total losses as tankers are in proportion to the total merchant fleet, they would amount to somewhere between 100 and 120 vessels. Much progress has been made in the war against submarines in the western Atlantic as is proved by the reductions in war-risk insurance rates, the best available barometer of the United Nations' shipping losses.

Actual losses from submarine warfare have been supplemented by the necessity for convoying which has reduced the efficiency of the remaining vessels as much as 50 per cent. Therefore when the 1941 and 1942 losses are subtracted from the January 1, 1941, non-Axis tanker fleet of possibly 1,250 to 1,300 vessels and the efficiency of the remainder is reduced 50 per cent, it is obvious that curtailment in production and consumption in the areas which they served is inescapable.

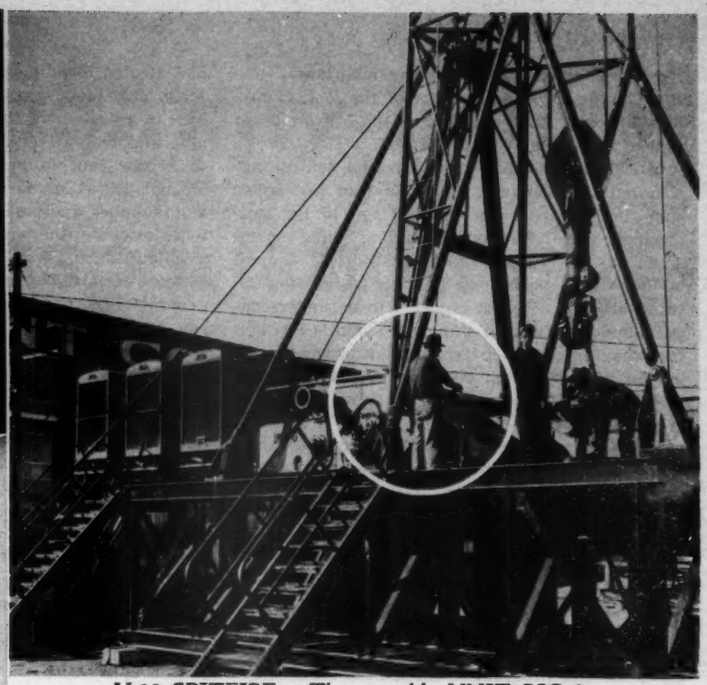
Supply Lines Lengthened

The seriousness of the situation has been abetted by the loss of supply sources on one hand and the expansion of the war zones on the other. Complete loss of the Far Eastern oil-producing fields and refining centers made it necessary to supply Australia and New Zealand from the distant Persian Gulf or from the West Coast of North and South America. Sydney is 4,000 miles from Balik Papan and 4,300 miles from Palembang, normal sources of supply, but is 7,354 miles from Abadan and 6,700 miles from Western Hemisphere Pacific ports, possible alternative sources. The war has spread from its original one-continent status to four-continent proportions and even to five if the submarine warfare in South American water can be regarded as bringing that continent into the area of operations.

Just what these far-flung operations mean from an oil standpoint is apparent from the statement by Sumner T. Pike, new OPA oil adviser, who said that two-thirds of the supplies allotted to each soldier on the second front are oil. When it is considered that 500 merchant ships participated in the North African convoy, the volume of oil and the number of tanker ships involved is obviously great. This supply problem is not limited to the Far East and North Africa but also includes the U.S.S.R., which during the past year lost one minor source of crude-oil supply and, at least temporarily, the full control of the vital Volga, the principal means of supplying western Russia with oil. It has been said that the Volga handled 70 per cent of Russia's internal distribution. This has made it necessary for the United States to supply some of the Soviet requirements.

Several steps have been taken to solve the oil-transportation problem and to equalize its effects. First of these is an acceleration of tanker construction. From readily available reports it is indicated that approximately 60 tankers will be delivered by United States shipyards in 1942. While this is more than a 100 per cent increase over 1941 it is still well short of the "hoped for" total of 100 expressed by an official of the Maritime Commission as late as last October. Tanker construction has lagged behind cargo-ship building because the average tanker requires 60 per cent

AIR CONTROLLED *for action-*



U-10 SPITFIRE — The portable UNIT RIG in illustration is equipped with a Lee C. Moore 122 foot mast and built for 7000 feet drilling. It is powered with 3 WAK Waukesha engines, and equipped with two 7¼ x 12 mud pumps connected for series or compound operation.

All controls are grouped at the driller's position for operating by air, the drum drives, rotary drives and pump drives through Air-O-Matic clutches — and engine drives through Airflex clutches.

This group control makes it posible to connect or disconnect any one of the three engines at will, or either of the two pumps, thus permitting single or compounding operation of engines or pumps.

All drums and rotary speeds are selected through UNIT RIG Flexible Speed Control.

Safe as a Locomotive Air Brake!

- SPITFIRE
- MOTORIG
- MOTOHOIST

} *all are equipped with* AIR-O-MATIC CLUTCHES

UNIT RIG & EQUIPMENT CO.
TULSA OKLAHOMA U.S.A.

more steel and 40 per cent more man hours than the Liberty ship and because of the lack of propulsion units. Another factor is the conversion of tanker hulls into aircraft carriers.

Other countries, both anti-Axis and neutral, are also building tankers. Britain's rate of tanker construction was reported long ago to be "surprisingly high." Sweden is building some, mostly small coastal types of 1,000 tons or less, though at least one 13,500-ton, 14-knot vessel for the transportation of oil is reported to be under construction in a Swedish shipyard. Spain is credited with having a tanker-construction program calling for eight 8,000-ton vessels to augment a fleet that 2 years ago consisted of 13 vessels of 83,500 gross tons.

Another step was the establishment of commissions having control over tanker movements. One such commission was set up in London to govern the movement of anti-Axis vessels and after the United States entrance, another was set up here to regulate movement in Western Hemisphere waters. This step related to another, the rationing of transportation to equalize deliveries. Early in 1942 it was determined that in this hemisphere the first consideration should be given to the war program of the United States; second, to the war efforts of South American countries, and final concern to civilian requirements

Lake Maracaibo tankers loading cargoes for shipment to refineries in the Netherlands West Indies

after the former two classes had been met in full. First the attempt was made to supply 85 per cent of normal civilian consumption, later it was reduced to 80 per cent and in July it was cut to 40 per cent.

One effect of this policy was to limit consumption in those countries or areas dependent wholly or in part on imports, such as Brazil, Uruguay, Paraguay, Chile, the Central American countries, and the greatest consuming area on the continent, the northeast United States. Another effect was to curtail production in the crude-oil and refined-products exporting countries. This was true of Latin America's most important exporting countries, Venezuela and Colombia. In the first half of this year Venezuela's production was reduced more than 50 per cent while Colombia's production, dependent almost wholly on export markets, was cut from 83,500 bbl. daily in February to 6,500 bbl. per day in October. Mexico also suffered severely from the loss of export markets.

In Brazil the use of private cars was prohibited and alcohol blending was undertaken on a large scale. This blend amounted to as much as 90 per cent in areas where the alcohol was readily available and was set at 30 per cent after being up to 50 per cent in areas which had insufficient alcohol. Diesel oil is much in demand in Brazil and supplies had to be augmented by dilution with kerosene, the percentage of the latter rising as high as 80 per cent. An estimated 1,300 vehicles were also converted to operate on charcoal generator gas. Uruguay was the first Latin-American country to institute coupon control but despite its prompt action in this respect, conditions there are so acute that the banning of private-car use is considered a likelihood. Cuba found it necessary to stop the sale of gasoline in November as Puerto Rico had done in June. Argentina, where domestic production is inadequate, placed a tax on liquid fuel producers to raise money to buy tankers.

The need for delivering products to combat areas and to war-industry regions has placed the emphasis on products transportation at the expense of crude-oil shipments. This has contributed further to the lack of tankers for countries normally exporting large volumes of crude oil. This fact, coupled with the loss of their normal markets in Europe, has probably reduced the crude-oil output of the Near East countries to the limit of their local refineries or, rather, to the limit of their ability to export refined products.

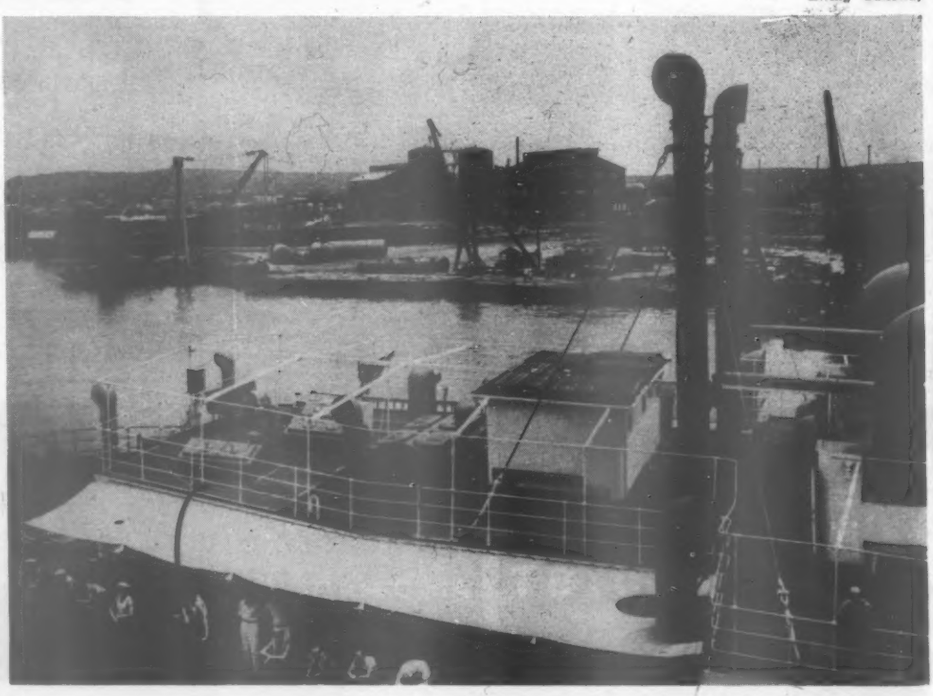
The effect of inadequate transportation has not been felt alone by the United Nations but apparently is also proving a major handicap to the Axis. Inability to get fuel to Africa reportedly led to the abandonment of much equipment by Rommel's army in its flight from Egypt and Germany is also reported to be delivering fuel and lubricants to Nazi armies in Russia by plane. Italy had hoped to increase shipments by tanker from Constanta, Rumania's Black Sea oil port, but Turkey is said to have refused permission for a converted naval tanker to pass through the Dardanelles after classifying it as a military-cargo carrier. Germany is charged with having attempted to take 15 converted French naval tankers from North Africa to the Black Sea to supply her armies in southern Russia from Constanta.

Japan Believed Hard Hit

Japan, far eastern Axis satellite, is believed to be having serious difficulties. Japan has ample actual or prospective crude-oil supplies as a result of her conquest of the East Indies but the mere possession of crude oil is not in itself an asset. It must be refined and transported to areas of consumption. Nipponese forces are in Burma, China, and Manchuko on the Asiatic mainland and have island bases from Kiska in the Aleutians to Rekata Bay in the Solomons. Bases in this vast area of millions of square miles must be supplied by tankers vulnerable in almost all instances to attack by submarines and in many instances by planes. Approximately 30 Japanese tankers have been reported sunk or damanged, a number equal to 60 per cent of the prewar fleet with which she was credited.

The Japanese problem was described by Adm. Chester Nimitz weeks ago when he said: "From the Malay Peninsula the Japanese are farther from the Solomons than their home waters are. You can make as good a guess as anyone else as to how much they can get from the Philippines and the Dutch East Indies. . . . Whether the Japanese are moving oil from the Dutch East Indies to Rabaul is hard to say. The chances are their supply problem is giving them many a headache. Every ship sunk by a submarine increases their problem."

Ewing Galloway



A harbor in Aruba, showing refinery vessels and tubular goods on the far dock. One of the world's largest refineries is in the background

Pan American Highway Is Key To Wartime Transportation

By EDWIN W. JAMES
Chief, Inter-American Regional Office,
U. S. Public Roads Administration

This discussion of transportation potentialities of the Pan American Highway system deals with the broader aspects, but the prospects have a pertinent connotation for the oil industry.

Aside from the probability that extended use of the system would vastly stimulate oil consumption there is the likelihood that movement of oil-industry materials within the Latin-American countries and from this country to the southern republics will benefit.

MILITARY leaders of the United Nations have continually stressed the fact that the present world conflict is basically a war of transportation. Every medium of transportation is included in this battleline, and these lines of communications are the very fiber of world military strategy. And in the vast interplay of movement of men and military machines on the global battle fronts, the Pan American highway system is destined to play a vital wartime role.

The construction of the Pan American Highway, like the building of the Panama Canal, may be classed as a milepost in mankind's constructive achievements. The joint effort to build this great system of highways and principal connections of some 15,000 miles is a monument to the cooperative spirit of the Western Hemisphere republics, in sharp contrast to the holocaust of destruction now consuming the social and economic fabric of the Eastern Hemisphere.

The universal shortage of ship transportation has increased the importance of the Pan American Highway as a potentially vital factor not only in the "battle of supply lines," but also in the "battle for raw materials" so essential to our increased war production. South America is veritably a "storehouse of strategic materials" for the great munition industries of the "arsenal of democracy," and is now more important than ever before as a source of strategic materials formerly obtained from the Far East. Recently, Undersecretary of War, Robert Patterson, emphasized that raw materials are now the key to war production and the War Production Board's labor advisory committee made a strong statement in similar vein.

Vital Importance of Highway Transportation

The Pan American highway system has been under construction for almost 19 years. When it is completed nearly half a billion dollars will have been expended on it. Construction and improvements of this highway system are continuing today throughout the Americas.

For the internal movement of materials in South America there already exist various railroad, air, and river shipping facilities. Others have been proposed or are under construction which can be coordinated with the Pan American Highway. The course of the highway has been strategically laid out so that there are now convenient connections with other forms of transportation.

Right now the question is—Can the Pan American Highway provide a major contribution to the war effort in the immediate future? Or must we wait until every mile of highway is paved from the United States-Mexican border south to Chile and Argentina? Can the Pan American Highway be utilized to bring strategic materials from the other American republics to the United States? Can the Pan American Highway lessen the pressure on and destruction of shipping? The answer is an unquestionable affirmative, under certain concomitant conditions.

The use of highway transportation has figured very prominently in this world crisis. The Government has recognized the importance of highway transportation for the movement of materials by granting large loans and appropriations to the other American republics, totaling between 85 and 95 millions of dollars, for the building of the Pan American Highway through Central and South America. The same objectives are involved in the recent decisions to rush a "pioneer road" from the Mexican-Guatemalan border to Panama City to be linked by June 1943, with the Mexican railway system leading north to the United States border, and to rush to completion the Canadian-Alaskan Highway to make it available for motor transportation for defensive as well as offensive operations. But even these loans and appropriations may be inadequate if we want speedier construction.

Enemy attacks, whether direct or by means of sabotage, aim at dislocation of transportation arteries. British experience has shown that highway transportation is less vulnerable to attack than either railways or water facilities, which normally carry the major portion of passenger and freight traffic. In the event of attack proportionately greater reliance must be placed on highway transportation.

The wisdom of a planned international highway system as a basic part of our war program has been dramatically exemplified by China's Burma Road. Scooped out in 10 months by the back-breaking hand labor of more than 100,000 men, women, and children, this highway functioned for almost 5 years, pouring new life blood into the armies of China. Observers who have compared the Burma Road with finished sections of the Pan American Highway, such as those in Peru and other American republics, rate the Burma Road as a back-country, grade D highway. Yet in 1941 the Burma Road managed to provide 20,000 tons of vital military and hospital supplies every month for the fighting Chinese armies.

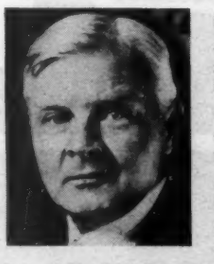
Compared to Burma Road

When the Burma Road was first opened in 1937 its capacity was limited to about 5,000 tons a month. Despite lack of machinery and equipment, lack of organization, technical difficulties, lack of fuel, inadequate surfacing and an unremitting rain of Japanese bombs, this artery continued to function until Burma was conquered by the enemy. Chinese humorists' favorite jibe at the Japanese was that a Jap bomb cost a thousand dollars—the hole it made in the road cost 8 cents to repair. Today the Chinese are building another highway to connect China's stronghold, Chungking with India.

Over the Burma Road moved strategic materials such as tin, antimony, tungsten, wolfram, lead, quicksilver, tung oil, mica, acids, and TNT. Other items reported to have been trucked over the Burma Road included heavy and bulky materials such as iron, steel, railway parts, shipbuilding parts, and copper. Reports indicated that a large percentage of the truck loads consisted of fuel—there being few sources of gasoline supply on the road. Such trucking of fuel would not be necessary along the Pan American highway system. Some fuel facilities are now available and gasoline depots could be established. Also, there are a large number of diesel-motored trucks in South America that might be used, which require considerably less fuel.

The supplies that were routed to the Russian armies from the port of Murmansk and then were shipped southward from that city by truck and rail, helped Russia to weather the first terrific onslaught of the Nazi war machine. In the Middle East theater of war a combination of long-distance truck hauling over highways combined

(Continued on Page 94)



Edwin Warley James is chief of the Inter-American regional office of the U. S. Public Roads Administration. He is one of the great roadbuilders the United States has produced. Mr. James is in direct charge of United States activities in connection with completion of the Pan American Highway.

Mr. James spends as much time in the field as in Washington. Bridge building in Central America is under his direction. So also are the engineering reconnaissance surveys being made to determine the route from the Panama Canal south to Colombia.

He is author of many important highway engineering studies and articles, including "Highway Construction Administration and Finance." He was an official delegate of the U. S. Government at the fourth Pan American Highway Congress held in Mexico City in 1941.

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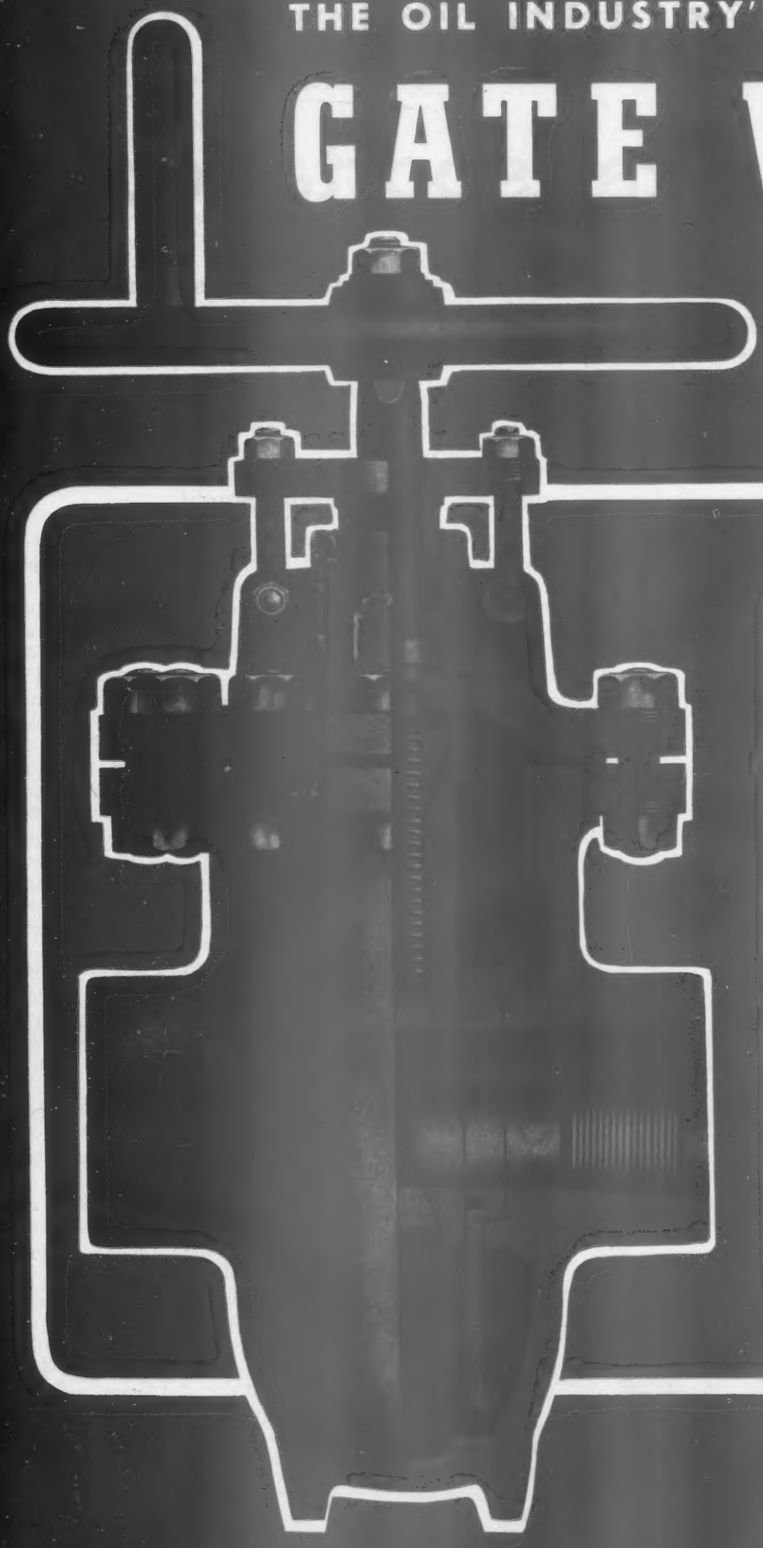

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with rail and water shipping is now being utilized to bring in supplies to bolster the Russian effort to hold the Caucasus oil region, thus further proving the necessity and feasibility of coordinated rail, ship, and long-distance trucking under the impetus of military or strategic exigencies.

The "Fighting French," too, built new highways, one about 1,700 and the other about 1,900 miles long, through French Equatorial Africa for the transportation of supplies for the Near East front, under very difficult conditions and at high costs. These highways enable the "Fighting French" to attack the Italians in southern Libya.

In each of these instances, highway transportation proved to be successful and indispensable.

The Present Transportation Situation

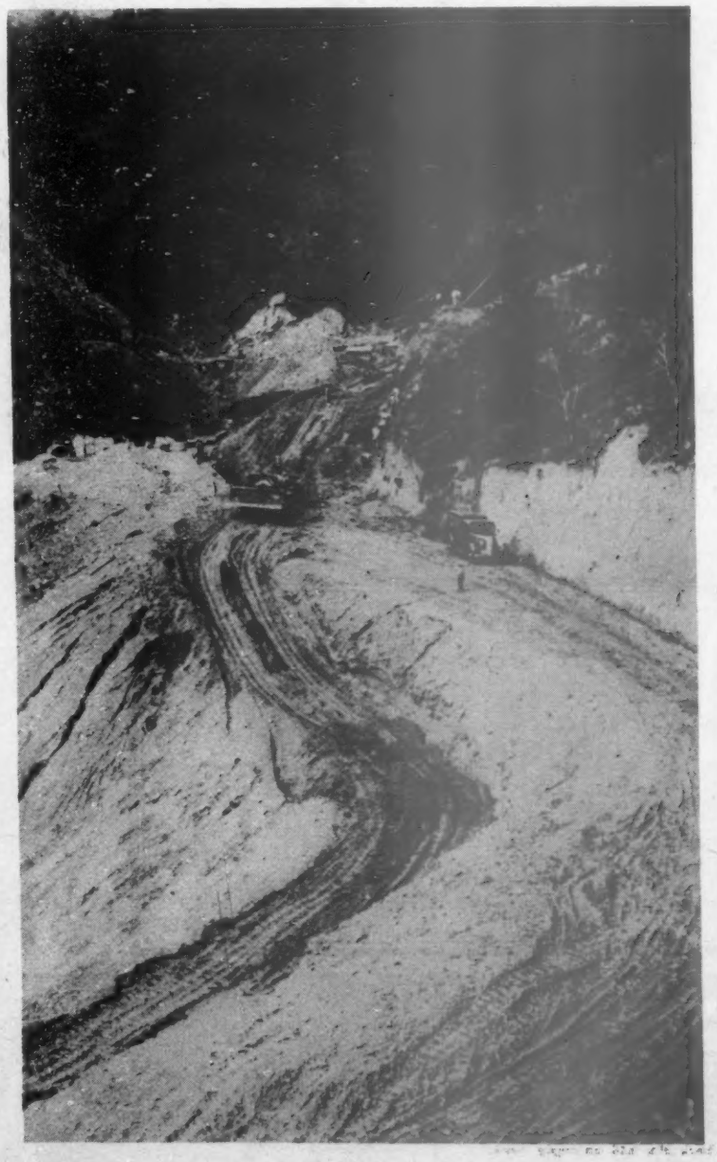
Ships still are the principal means of moving commodities in inter-American trade. Since Pearl Harbor, published reports indicate sinkings of more than 500 ships and the damaging of many others in Western Hemisphere waters. So acute is the situation that, except for air transport and cable communication, we face the threat of being cut off from the other American republics unless the present trend can be reversed. It is a terrific attack and possibly the most successful Nazi war operation of 1942. Nothing approaching such dislocation in the nation's sea traffic has been experienced since the War of 1812.

Indeed, so serious is the problem that radically new ideas are being developed or are under consideration to cope with the submarine menace. Construction of a new type ship, the so-called "sea otter," and of huge cargo-carrying planes has been considered. Recently the Government announced a $10,000,000 program designed to acquire an emergency fleet of existing sailing vessels and indicated its intention to build others in the other American republics. However, no reduction of the long sea distance to be traversed will result. Therein is the crux of the inter-American transportation problem. It is the long sea distance which makes this menace to our shipping so crucial. If transportation between the Americas over the long sea routes can be sharply reduced and if at the same time a continuous flow of essential supplies can be maintained, we are on the way to a solution of the problem.

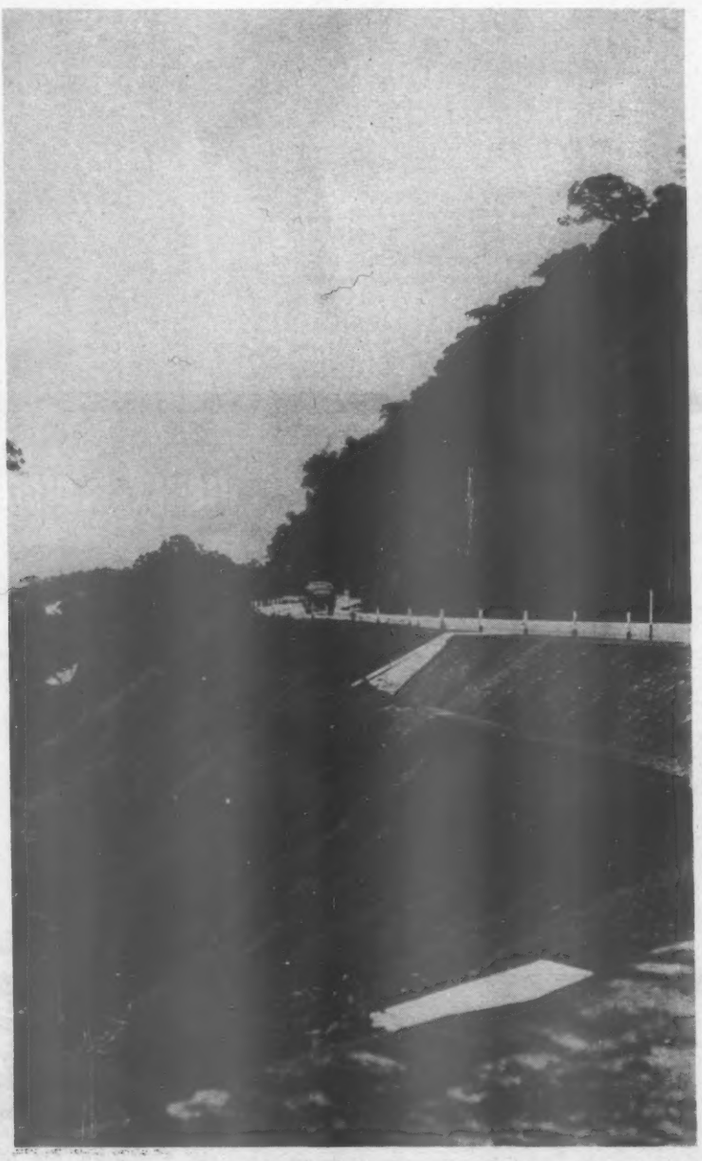
United States shipyards are working at top speed turning out vessels in record time. Production perhaps is running neck and neck with the number of United Nations ships being destroyed and damaged by the Axis. Recently, Rear Adm. Emory S. Land, chairman of the Maritime Commission, warned that "We can't lick the submarine menace, though we may be able to ameliorate it." However, even if shipbuilding equalled sinkings it would not necessarily relieve the situation. Balancing the books is not enough.

Our war output is impotent unless we can transport munitions and other supplies thousands of miles to the fighting fronts. We hear about our great production efforts—the excellent training of our Army and Navy and air forces—but between them stands the problem of logistics—that branch of military science dealing with the moving, quartering, and provisioning of armies. Ships to carry men and supplies are our first necessity in opening a second front in Europe or striking with concentrated power at the enemy in any theater of war. If we are to control the shipping situation, bold measures will have to be taken to combat or circumvent the U-boat in the Battle of the Atlantic.

Shipping distance from Buenos Aires, Argentina, to New York is 5,871 nautical miles, if ships follow the normal peacetime shipping lanes around the northeastern hump of Brazil, and then sail in a straight course in the general direction of Cape Hatteras and thence to New York. The usual freight ship passage during peacetime over this route requires 24 days and often more. A major portion of the trip is in the South and



Construction scene on a portion of the system in Costa Rica



A portion of the highway from Rio de Janeiro to Petropolis, Brazil

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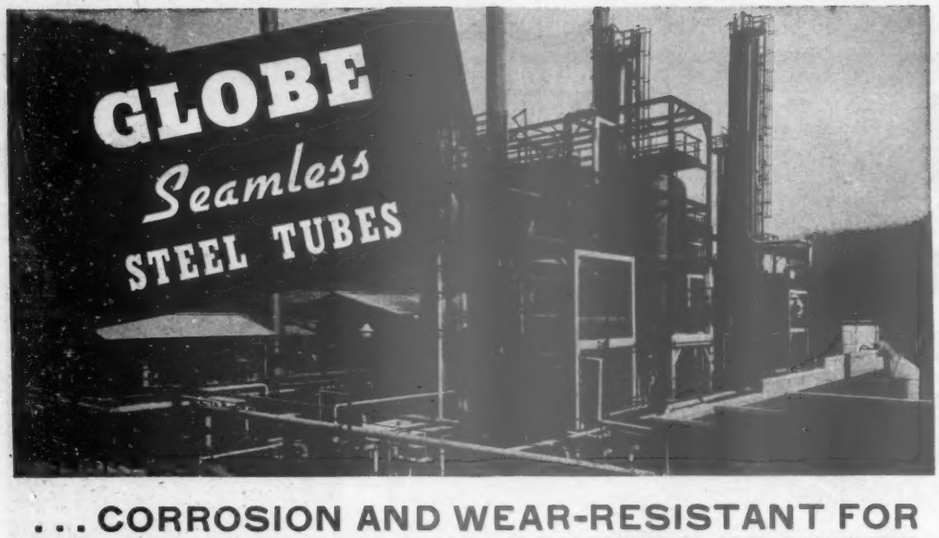

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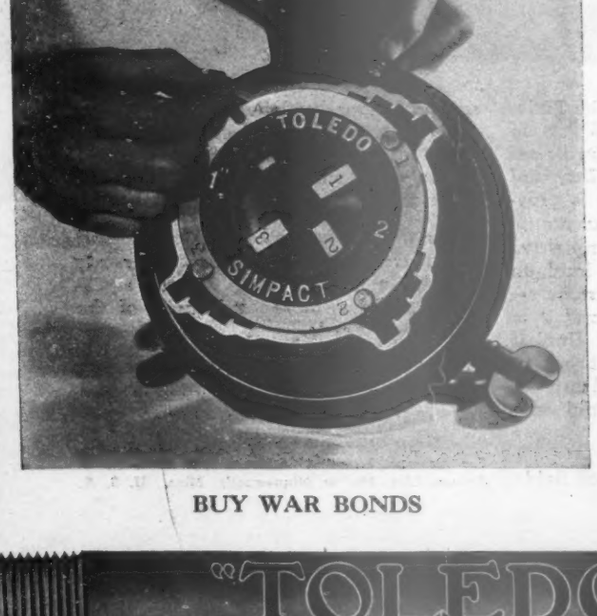

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North Atlantic, where the incidence of ship sinkings has been highest, including sinkings of vessels of South and Central American registry. A part of the voyage from Trinidad north is made in secondary naval and aerial patrol zones. Through a greater part of the trip, ships do not have the primary protection of Army or Navy patrols except at the time ships are about to enter waters adjacent to ports of destination in the United States.

In view of restrictions on shipping, it may be well to reexamine our transportation channels. Alternatives may offer difficulties and barriers, but these are not insurmountable.

Alternative Combinations of Routes

Since it is the long sea lanes which expose shipping to attack during wartime, the problem resolves itself into a reduction of long-distance sea transportation by utilizing alternative water and land routes. One need only glance at the map to note that the distance between Valparaiso, Chile, or Buenos Aires, Argentina and North Atlantic ports such as New York is much greater than the distance from Buenaventura, Colombia, or La Guaira, Venezuela, to New Orleans, La.

Obviously there is a great advantage in routing shipping over the Caribbean Sea and the Gulf of Mexico. Not only is the sea route shortened, but the Gulf and Caribbean region is already under the vigilant eyes of the Army and Navy, because of its proximity to the Panama Canal. The concentration of the major part of the inter-American transportation in this area would also permit concentration of Army and Navy protective units in this region. Thus protection will be increased in proportion to the shortening of the dangerous sea distance.

In weighing alternative combinations of land and water routes, it is the South American section of the Pan American Highway with which we are at present concerned. Except for about 2,000 miles of continuously surfaced roads in Mexico, the 3,500 miles of the North American section of the Pan American Highway (known as the Inter-American Highway north of the Panama-Colombia border) is not under consideration as that section is still under construction. Some intermediate sections are completed, but will not be continuously connected until June 1943. Approximately 300 miles of territory in southern Panama and northern Colombia are still only semiexplored.

The South American section of the Pan American Highway between La Guaira, Venezuela, and Rio de Janeiro, Brazil, is about 8,200 miles long, following for the most part the Pacific Coast through Colombia, Ecuador, and Peru, and continuing southeast through Bolivia and Argentina and thence northward along the Atlantic Coast through Uruguay and Brazil. It is about 325 miles longer from the junction point at Vitor, Peru, by the western route which continues south through Chile and eastward to Argentina.

The Pan American Highway's completed and projected routes are traced on the accompanying map. Reports reaching the Public Roads Administration as of August 1941, indicated that the highway in South America was 76.1 per cent finished for "all weather" driving—which means all-year round. In addition 20.3 per cent, which is "dry weather" road, can be used 6 months during the year, bringing the total of useful highway to 96.4 per cent for at least 6 months in the year. During the past year additional construction and improvements probably have moved this figure up to about 98 per cent.

The principal bottleneck in South America is a 290-mile stretch in Ecuador. For construction in this area the Export-Import Bank of Washington has made a loan of $900,000 to Ecuador. Only 75 miles of road can be constructed with this loan. However, with the immediate additional expenditure of approximately $7,500,000 for construc

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INDICADOR AUTOMATICO PARA TANQUE
Figura ST-2935

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RESPIRADOR A PRUEBA DE INTEMPERIE
Figura ST-949

Una válvula respiradora del tipo de movimiento vertical, con espigas diseñadas para proveer el máximo de eficiencia en la conservación del vapor y seguridad del tanque bajo toda condición atmosférica.

TAPA DE INDICADOR A PRUEBA DE CHISPAS
Figura ST-191

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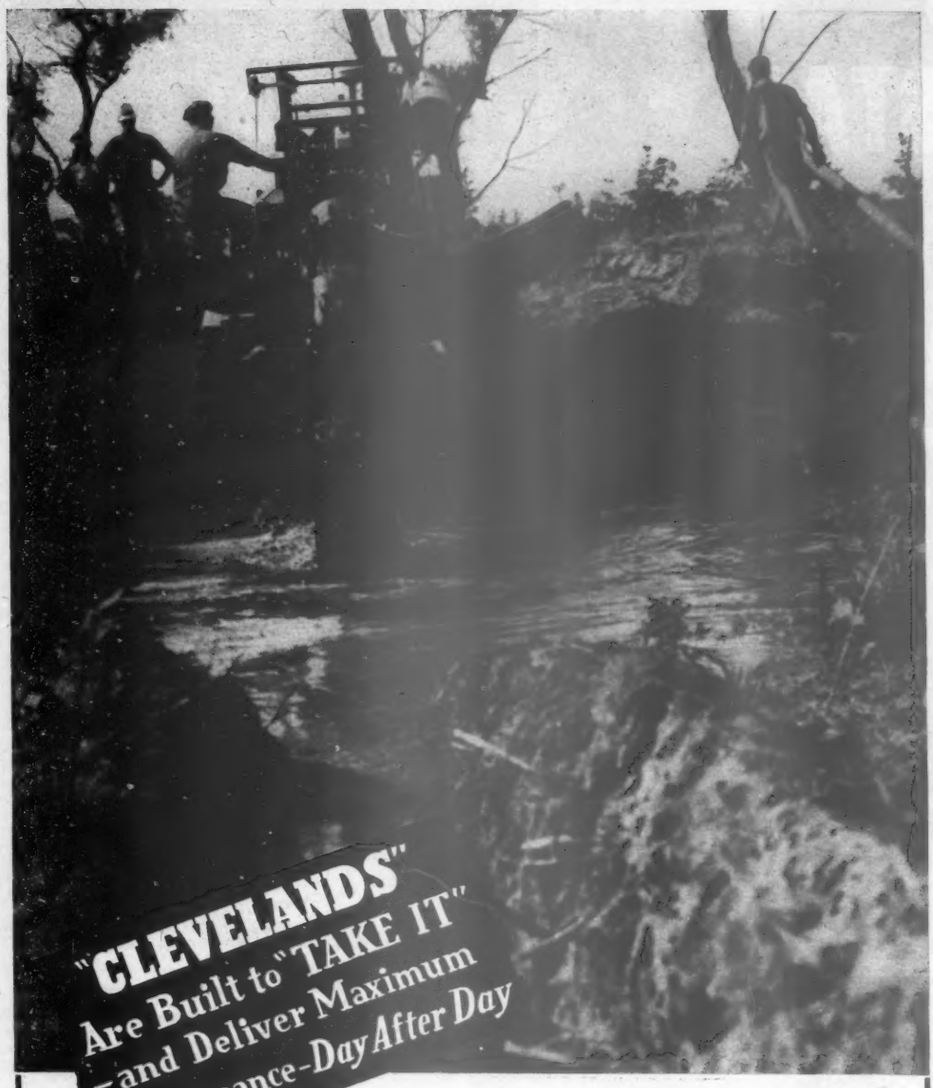

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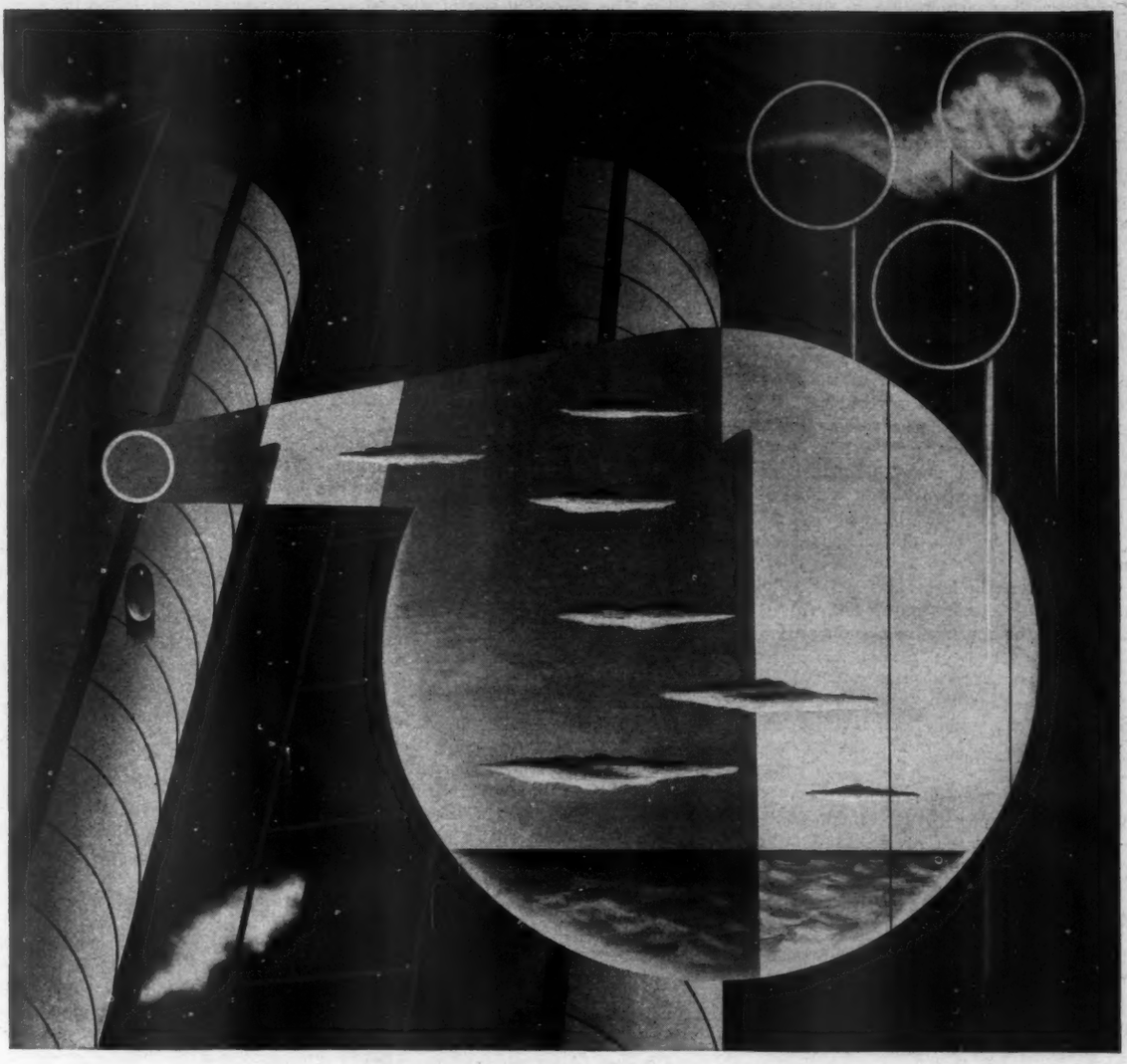
tion in this area it would be possible to make a detour road available in 2 months and to complete the 290-mile gap in about 5 months of actual construction work. The construction time element depends on the amount of necessary road-building equipment made available and the provision of shipping space and other facilities to get road gangs and supplies to construction sites

It is not unreasonable to expect that building of the highway in the Ecuador region, although it is mountainous territory, could be completed in record time if the funds and equipment were made available. Speed of road construction is exemplified by the Australian Government, which completed 600 miles of highway in 93 days, under very difficult circumstances during the stress of its wartime emergency. The Italian Government, too, in building roads through Libya in order to attack Egypt, has been reported to have built 1,200 miles of highway across the desert in 10 months under difficult conditions. Italy's conquest of Ethiopia in 9 months, some authorities believe, was largely due to the speed with which roads were built to move military forces with motorized equipment into the interior of the country.

Part of the completed highway in Mexico, showing route marker and one of the passenger buses in regular service over this section of the system

Until the 290 miles of road in the Ecuador section are ready, whether in 2 months, 5 months, or several years, the area between Talara. Peru, and San Juan, Ecuador, may be negotiated by a 10-hour water jump of about 175 miles from Talara to Guayaquil, Ecuador, or from Puerto Bolivar to Guayaquil—a distance of only 90 miles. Ship schedules and service are now military secrets, but no doubt a ship-ferry service for trucks carrying important materials could be arranged. From Guayaquil, Ecuador, a 115-mile detour east to San Juan, Ecuador, situated on the Pan American Highway, can be used in the "dry weather" season. It would require only about 2 months to make this road ready for "all weather" truck movements.

From April to November, in the 12,600-ft. Uspallata Pass in the Andes Mountains, at the border of Chile and Argentina, winter snows accumulate and prevent normal movement of wheeled traffic between the two countries for about 6 months of the year. If increased traffic warrants it, snow plows could keep this road open all year. The map shows the alternate central route north of Buenos Aires, Argentina, to La Paz, Bolivia, connecting with the western branch of the Pan American Highway to Vitor, Peru, near the Pacific Coast of South America. This route could be utilized to service Argentina, Uruguay, Paraguay, Bolivia, and portions of southern Brazil during



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the winter months, so that there can be free movement of vehicles over the highway all during the year. Additional construction of alternative "all weather" routes are also under consideration. With Brazil's active participation in the war against Germany and Italy the movement of military supplies and strategic materials over safe dependable routes has become even more urgent.

Long-Distance Truck Transportation

Truck transportation over the Pan American Highway is expected to be a principal feature of future trade among the other Americas. Trade among the American republics is more important than ever before now that they are cut off from many foreign markets. Even if the present rate of shipping could be maintained, which is doubtful, normal requirements are not being met. A plan to supplement shipping by utilizing trucking over the highway for transportation to the United States of vital strategic supplies would be an important step in providing materials for urgent production of military weapons as well as maintaining South America's economy. This plan might well be considered an extension of the idea of shipping in small packages by sailing vessels, which is analogous to the splintering of cargoes into truck loads.

Recent reports from Peru indicate that plans are being considered to solve local transportation problems engendered by the shortage of shipping by using truck convoys over the Pan American Highway to haul goods from southern to northern Peru, over a distance of about 1,000 miles. These plans propose to accumulate cargoes in northern Peru and thus save a thousand miles of ship movements.

There are about 10,000 diesel-type motor vehicles in the Western Hemisphere. Approximately half of these vehicles are in the other Americas. Passenger automobile assembly lines have been dismantled, but not truck assembly lines. Over 150,000 gasoline trucks were reported to be frozen in dealers' show rooms when the executive order banning sales of motor vehicles went into effect. Only about 50,000 vehicles are believed to have been released. Thus a large stock pile of various sizes of trucks is still on hand, making it possible to divert a large fleet of gasoline-motor trucks for transportation of vital materials from South America. The expanded use of diesel-operated vehicles would mean a major saving of motor fuel as well as storage space and would eliminate to some extent dependency upon gasoline facilities, although fuel is available in South America. South American nations, too, have a supply of trucks which could be used and the truck movement would be as vital to them as it could be to the United Nations.

The number of motor vehicles to be made available by the United States would of course depend on the priority rating of supplies originating in South America. Everything must give way to the production and release of ships, airplanes, and military weapons, and since use of the highway would shorten very considerably the distance covered by United Nations shipping, it should be an easy decision to yield priorities on motor vehicles which would release the necessary ships for the transportation of airplanes and military equipment to the fighting fronts and at the same time obtain raw materials from South America to build more ships, planes and weapons. This entire process is indivisible for the successful prosecution of the war—one step impinges on another and all are equally important.

Facilities and Supplies

The question may be raised as to whether necessary supplies and service facilities exist in South America to provide for a large-scale, long-haul trucking movement. There is oil in Venezuela, Colombia, Peru and Argentina. Venezuela is the second largest oil producer in the world.

There are large quantities of asphalt in Venezuela and Peru. Asphalt can be used for completion, improvement and repairs of the highway. Other native materials have also been used effectively in highway construction in South America, as elsewhere.

There is rubber in Brazil, Colombia, Bolivia, Ecuador, Peru and Venezuela. There are 12 tire factories in South America. Recently, U. S. Government agencies have sent many technicians to South America to stimulate increased production. Forty thousand tons of crude rubber annually is expected to be produced in the other American republics in 1943 with progressive increases each year thereafter.

As to other facilities: Every part of the highway, where constructed, is now being used for inter and intra-American trucking and bus travel, although up to the present it has not been used extensively for the transportation of strategic materials to the United States, except for limited quantities coming from Mexico. The Mexican section of the Pan American Highway and other Mexican national and auxiliary highways provide a continuous system of about 2,000 miles of surfaced roads directly connected with those of the United States.

Availability of Labor Supply

Workers in the transport services are heavily in demand in the United States. South America has a population of approximately 90,000,000, mostly "simpatico" to the cause of the United Nations, which has not yet been brought fully into the war effort. Discontinuance or curtailment of transportation between North and South America would remove even more labor from the war effort, and doubtless would create economic and political difficulties with a detrimental influence. Utilizing the great labor supply in South America to maintain a fleet of motor vehicles and thousands of miles of highway and facilities for sheltering workers in their own lands, should prove mutually beneficial in the long run economic, political and military sense.

Relative Costs

The general movement of strategic materials from South America would decrease costs as the volume increased, although the important thing in this war is goods and time—not money. Strategic and critical materials vital to war production are available in many parts of South America. Some of them are: Oil, chromium, manganese, cocoanut shell char, mica, nickel, quartz crystals, quinine, rubber, tin, tungsten, magnesite, graphite, industrial diamonds and vegetable oils, as well as many other products necessary to fortify our civilian economy. After preliminary operations have started, ways and means of lowering costs and increasing volume will undoubtedly be developed.

Regular costs of shipping have no ceilings. War risk insurance and increased general operating insurance costs resulting from a prolongation of sailing time necessitated by the slow convoy system and the use of devious and longer routes to avoid raiding submarines have seriously increased expenses of operation. Some voyages which normally took 24 days now require as much as 44 days and often longer, if the ships reach home at all. Ships are frequently unable to get their normal bunkerage requirements and other supplies at ports where they were formerly obtained. Purchasing these supplies in other ports is far more costly now. Urgent need for strategic materials, with serious shortages rapidly developing, will make it even more imperative to risk shipping if the highway is not used.

A Proposed Solution—"Ports of Accumulation"

As a proposed partial solution a general movement of critical and strategic materials could emanate from Argentina and southern Brazil and accumulate westward through Chile, and northward tthrough Bolivia, Peru, Ecuador, Colombia and Venezuela, toward seaports situated on the Caribbean Sea and the port of Buenaventura on the west coast of Colombia on the Pacific Ocean.

General map of the Pan American highway system with a more detailed inset of Mexico and Central America

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Secondary roads, airports and railways are built in and adjacent to this region and around the ports of Maracaibo and Puerto Cabello, in Venezuela, and Baranquilla, Cartagena and Santa Marta in Colombia. Extension and improvement of these secondary roads could be quickly speeded and these roads could be coordinated with a system of river routes, airlines and railroads to make these Caribbean ports more accessible. At these "ports of accumulation" there already are storage warehouse facilities and more could be quickly built. Colombia's own road program includes improvement and extension of secondary roads in this area. Another important link, which is nearing completion, is a new highway which will connect Cali and Palmira, Colombia, on the Pan American Highway, with the port of Buenaventura on the West Coast. When completed the new highway will supplement the railroad now operating between Buenaventura and Cali and Palmiri, Colombia. Highways in South America can also serve to draw certain vital materials from the interior and accumulate them at central airports thus expediting fast air freight shipments as well as ordinary shipping.

Colombia's 1,000-mile Magdalena River, which empties into the Caribbean Sea, is navigable by 500-ton steamers for a distance of 560 miles, from the town of La Dorado to Barranquilla. Despite irregular steamer service, during 1940 more than 500,000 tons of cargo and more than 350,000 passengers were transported by this waterway. The Atrato River also is navigable by steamer for 315 miles between Quibdo northward to the mouth of the river in the Gulf of Uraba. From the mouth of the Atrato River steamers can proceed through the Caribbean Sea to Cartagena.

Peru and Bolivia, too, are stepping up auxiliary road construction. Nearing completion is a 350-mile highway which will eventually link Lima, Peru, with its eastern empire across the Andes to Tingo Maria, site of a new agricultural experiment station. The terminus of this new road will be the river port of Pucallpa on the Ucayali River. River boats connect with Iquitos at the headwaters of the Amazon River. Ships with a tonnage as high as 3,000 can navigate from the mouth of the Amazon River on the Atlantic Ocean to Iquitos. Thus in effect a transcontinental Atlantic Ocean-Amazon River-Pacific Ocean river-road artery may soon traverse the widest part of the South American Continent.

Strategic Equations—Caribbean-Gulf Convoys to Supplement Pan American Highway

From these South American Caribbean ports shipments would be made to the United States. Allied vessels also could make pickups for British, Chinese, and Russian distribution. This would eliminate thousands of miles of precarious ocean travel by British and other Allied shipping. For shipments to the United States, this routing would reduce the ocean distance to passage over the Caribbean-Gulf region only. Shipments to Britain, China or Russia or other fighting fronts would depend on the originating port of the voyage in the Eastern Hemisphere. Materials could be routed to the port in South America nearest the port of origination which would reduce the sea distance to a minimum. This routing would avoid voyaging north or south along the east and west coasts of South America and at the same time obviate the necessity of sailing the long sea distance through the Panama Canal or rounding Cape Horn.

La Guaira, the seaport serving Caracas, the capital of Venezuela, and Maracaibo, Cartagena, Barranquilla, and Buenaventura are all ports within the Army and Navy primary sea defense zone. Most of these ports are surrounded by a highly integrated system of military and naval bases on virtually all sides. While this area is not necessarily safe, nevertheless, ships convoyed by a moderate number of naval or air units over the shorter water route through the Gulf of Mexico and the Caribbean Sea could provide the maximum relative safety over the minimum sea distance.

The number of sinkings to date indicate that, of those in the Gulf of Mexico, the Caribbean Sea and North and South Atlantic, most have occurred in the open sea, which is much more difficult to patrol than the smaller area of the Caribbean Sea and the Gulf of Mexico. To bolster the defensive system in the Gulf of Mexico area and in line with its declaration of war against the Axis, the Mexican Government is reported to have prepared at least 25 speedy motor torpedo-boat convoy patrols, and is expecting to double or triple this number in a few month. The United States Navy also recently introduced convoys in the Caribbean. The commander of one of the swift, hard-hitting Navy escort vessels of the first Caribbean convoy recently summed up this development when he aptly said, "They may sink our ships, but from now on they fight for every one they hit."

Ships crossing the Gulf of Mexico from the "ports of accumulation" could be docked in the United States at Houston, Tex.; New Orleans, La.; Mobile, Ala., or at Tampico and Vera Cruz, Mexico (highways and standard gage railways to the United States border run from these Mexican ports); or at other United States ports adjacent to manufacturing centers or strategically close to Army and Navy establishments, railheads or inland waterways or river systems. From these ports, rail, river, plane or truck transportation could assume the final task of domestic distribution of products to inland industrial centers.

Another alternate shipping route is that from the oil center and port of Talara, Peru, or from the port of Buenaventura, Colombia, northward up the Pacific Coast to the port of Acapulco, Mexico (a surfaced highway connects with the Pan American Highway at Mexico City, leading to the United States border), or the ports of Mazatlan, Manzanillo, and Salina Cruz which are connected with the United States by standard-gage railways, or ships can sail directly to United States West Coast ports. There have been very few ships sunk off the Pacific Coast of North and South America by the Japanese.

If the shipping shortage gets tighter—and all the signs indicate that conditions may get worse—from the standpoint of availability of ships the Pacific route is the second best choice. The sea distance would be reduced, but not enough. The Caribbean-Gulf routing is the shortest and would require the least number of ships—which is the key to the release of more ships and the lessening of ship losses, and the hastening of new fronts to smash the Axis.

Numerous Considerations

The economic, military and political significance of continuing our trade with the other Americas and utilizing their highways and railroads and the large available labor supply in politically cooperative areas may perhaps equal in importance the entire movement of strategic materials.

During 1941 the United States purchased about 1 billion dollars' worth of goods from the Americas—almost doubling 1940 purchases. The entrance of the United States went into the war late in 1941 and the shipping shortage have seriously affected the economies of the other American republics. The development of a modern coordinated all-year-round trucking, railroad, airplane, and shipping transportation system as a solution of this problem would be a major accomplishment and a boon to the hard-hit econ-

(Continued on Page 107)

Extensive Development Plans Launched in Northern Canada

By L. P. STOCKMAN

TENTATIVE plans are under way to start additional drilling in the Northwest Territories about 50 miles north of Fort Norman on the Mackenzie River in Canada and just south of the Arctic Circle. This project, which has been under consideration for several months, contemplates the development of additional production at Fort Norman, the laying of a small-diameter pipe line 400 miles westward to Whitehorse and construction of refining facilities at the latter point. This program, it is thought, will promote the war by making available fuel oil and other refined products in the Yukon section of Canada and Alaska. The Whitehorse Pass Railroad from Whitehorse in the southern Yukon to Skagway, Alaska, is an integral link in the distribution program. By moving crude oil southward from Fort Norman to Whitehorse by pipe line it would be possible to transport fuel oil, gasoline and other refined products by rail to Skagway and thence to Juneau. This would eliminate the long haul from California ports or British Columbia to western Alaska and obviously reduce marine losses resulting from enemy submarine activities.

This projected expansion of production, pipeline and refining facilities in the Fort Norman-Whitehorse-Skagway triangle is especially interesting in view of the fact that the recently completed Alcan Highway passes close to Whitehorse, over Dawson Creek in the Yukon territory, Canada, to Fairbanks, Alaska, one of the strong military bases. By using the Alcan Highway, which is completely graveled from Dawson Creek to Fairbanks, and in excellent condition, it will be possible to move refined products entirely by inland routes. As a matter of fact, the Alcan Highway was constructed for the specific purpose of moving material and equipment by motor transport and thus reduce marine transportation as much as possible. Mining men recently home from Alaska, who will not return to that area until after the war due to restrictions on travel, lack of equipment and application of regulatory orders affecting mining operations in general, are loud in their praise of the construction work done by American Army engineering regiments and civilian employes.

The projected expansion in the Northwest will be done with American money as it is too big for any single company to handle and requires priorities for equipment. The entire plan is receiving careful consideration and obviously much depends upon whether sufficient crude-oil production can be developed at Fort Norman to jus-

tify the remainder of the program. Only limited data are available regarding the crude-oil reserve at Fort Norman and for this reason the initial work will involve the drilling of additional wells. Production was developed in the Fort Norman area more than 20 years ago, but, due to its location and the limited demand for refined products in the area, very little expansion work has been possible. Imperial Oil Co., Ltd., subsidiary of Standard Oil Co. (New Jersey), owns the producing wells and has a small refinery in the vicinity. The wells at Fort Norman are on the east side of the Mackenzie River and were drilled near an oil seep. The oil occurs in strata of upper Devonian age. The first well was drilled in 1921 and was completed as a producer at 990 ft. A second well was drilled in 1925 and completed at 1,602 ft. Production is limited to market demand and in 1936 production aggregated 5,399 bbl., in 1937 production reached 11,371 bbl. annually and during 1938 totaled 22,854 bbl. In 1939 production was 17,013 bbl. and since that time the output has averaged approximately 20,000 bbl. annually. Demand was slightly higher during the past 2 years, reflecting increased mining operations in the Great Bear Lake and Great Slave Lake regions, and to meet this increased demand Imperial built a modern topping plant in 1939 to replace a smaller unit. This new unit, which replaced an old installation with a capacity of 300 bbl. daily, is capable of handling 800 bbl. of charging stock per day. While a small amount of exploratory work has been done, no serious attempt has been made to expand the field because of the limited demand, inadequate transportation facilities and distance from outside markets. In 1939 a dry hole was drilled and abandoned but with this exception the area had been inactive until present emergencies revived value and demand for the supply.

Crude Production Is Key

The projected expansion program involving the Fort Norman, Whitehorse and Skagway area, depends entirely upon whether sufficient crude-oil production can be developed. It would not be necessary to predicate the undertaking upon a long-term basis as the present plan is a wartime measure and could be abandoned later if it served its primary purpose which is to provide refined products to Skagway and Juneau in southern Alaska and Fairbanks and other sections of central or western Alaska. The matter of transportation will involve many difficulties owing to wide variations in temperature. For this reason it is logical to assume that any pipe line installed would be laid in the ice pack beneath the surface as this would permit a stabilized temperature approximating 25° to 30° regardless of how low the surface temperature drops. When the program is completed, vessels will be able to bunker at Skagway and Juneau without having to use California fuel oil, and consequently some Pacific Coast marketers are keenly interested in the final outcome of the Alaskan-Canadian program. There has been some talk about flying the small-diameter pipe to selected points along the route, but it remains to be seen whether this is practicable and feasible.

The importance of Alaska in the present war and the necessity of having ample supplies of gasoline, aviation-motor fuel, lubricants, fuel oil, diesel and other refined products is generally recognized. Hence, the consideration now accorded the problem of developing production in Alaska. This is too big a job for any group of oil companies and thought is being given to provision of federal funds to prosecute a thorough exploration program involving the entire area. This could be done by some drilling company or by a group of companies provided sufficient funds and equipment were made available. Several attempts have been made by California companies to develop commercial production in Alaska, but to date the results have been unfavorable. Undertakings of this kind are too costly to permit adequate prosecution of exploration work. Work done to date has been by Standard Oil Co., Union Oil Co., Tide Water Associated Oil Co., Iniskin Drilling Co. and others. Iniskin Drilling Co. had expected to resume work on its Alaska wildcat this year, but the war will prevent further drilling unless the Government fosters the program.

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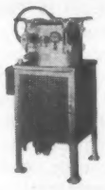

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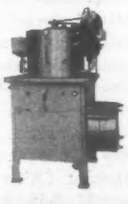

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Agua Caliente Field in Peru Could Deliver Oil via Amazon

INTERNATIONAL complications and the lack of adequate transportation facilities have proved an almost insurmountable problem for the Compania de Petroleo Ganso Azul (Blue Goose Oil Co.) in the company's efforts to inaugurate steady crude-oil production and marketing operations. The Blue Goose company has a daily potential production of 2,500 bbl. of light gravity crude oil in eastern Peru at the headwaters of the Amazon and a straightrun refinery with a charging capacity of 500 bbl. per day. The company's properties are at Agua Caliente, Peru, east of the Andes Mountains, approximately 2,800 miles upstream from the mouth of the Amazon River, which precludes economic marketing on the west coast. The war has made it impossible to get material for river barges and, since Brazilian laws require that exploration and refining operations must be carried out exclusively by nationals, there is some question regarding the interpretation of these laws with reference to transportation. The upper reaches of the Amazon, while deep enough to permit use of barges and tugs, is not deep enough for ocean-going vessels and is therefore not an international waterway. As the situation stands at present, Brazil alone holds the key to successful operation of the Blue Goose properties in eastern Peru. It is interesting to note, in this connection, that the United Nations could move refined products from the mouth of the Amazon River to Africa with a minimum haul if they desired The mouth of the Amazon is just north of the so-called bulge of Brazil which is the nearest point to the western coast of Africa.

Origin of Blue Goose

The Blue Goose Oil Co. was in reality born 13 years ago when Robert E. Moran, consulting geologist and engineer of Los Angeles, was making a survey of the Peruvian back country for Selden-Breck Construction Co. of St. Louis, Mo. The Selden-Breck interests were interested in the financing and construction of a proposed railroad from a point on the Ucayali River over the Andes, a rugged mountain barrier, to the west coast. Mr. Moran reported unfavorably due to the rough country involved and the fact that it would be necessary to ascend a 15,000-ft. mountain range in a comparatively short distance. While flying the National Air Lines service from San Ramon to Iquitos, Mr. Moran made some observations in geology out of which grew a second visit and subsequent birth of the Blue Goose Oil Co. The Amazon terminal of the new Peruvian highway will be at Pucallpa on the Ucayali River about 530 miles east of Lima on the west coast. The highway passes within about 30 miles of Agua Caliente.

This highway from the west coast will make it possible for Blue Goose Oil Co. to haul in additional material from time to time but the company's market for refined products undoubtedly lies to the east down the Amazon. The Peruvian highway starts at Callao on the Pacific Ocean, passes through Lima 8 miles inland and then climbs over Anticona Pass at an elevation of 16,127 ft., higher than Mont Blanc, the highest peak in Europe and higher than any point in the United States outside of Alaska. The last section of this highway lies between Tingo Maria and Pacallpa on the Ucayali River a distance of 177 miles. The romance attached to the building of this trans-Andean highway lies in the location of a pass in the Cordillera Azul or Blue Range.

When the Blue Goose company started operations in Peru it was necessary to bring equipment from New York to Para, Brazil, then upstream by barges. The Agua Caliente field contains five wells, excluding the first well drilled which was not completed as a commercial producer.

The Agua Caliente series of alternating sandstones and shales outcrops on the crest of the structure. It is of probable Upper Middle Cretaceous age and includes the oil-bearing zones. The six wells that have been drilled on the structure to date prove up a productive area of about 640 acres. No drilling is now in progress due to scarcity of materials and lack of an adequate market to absorb production already developed.

The Blue Goose Oil Co. secured its Peruvian holdings in 1937 from the Selden-Breck firm which had been awarded a 90,000-acre concession. During the early exploratory period, work was carried on by Glenn M. Earl and Douglas Fyfe. The first work consisted of describing the concession in minute detail in order to avoid any possibility of error. Using a theodolite and a method of astronomical observation proposed by the American Geographical Society ground positions were fixed with probable error not exceeding 100 ft. This area was a wilderness and not only not sectionized but also lacking bench marks and other means of location. The Agua Caliente structure as established by the above means is located 9° south of the Equator and approximately 75° west of Greenwich. A new rubber boom is under way in Brazil and this may enable Blue Goose Oil Co. to dispose of gasoline, diesel and possibly fuel oil.

●

China Launches Intensive Oil Development Program

Intensive development as possible of oil fields discovered in recent years is reported to have been undertaken in China. An extensive drilling program has been undertaken in the Province of Kansu where China's principal domestic sources of oil are located.

Development of the Kansu field was begun in a relatively small way in 1940 but a year ago production had been increased to 1,500 bbl. per month. This development was delayed by the inability of the Chinese to obtain drilling equipment. Sufficient equipment has arrived in the meantime, apparently, to inaugurate development work on a substantially larger scale.

Other oil deposits are known to exist in the Provinces of Shensi and Szechewan and preliminary surveys undertaken some time ago indicate that others will be found in the Provinces of Sikang and Sinkiang. The development work is being carried on by the National Resources Committee of the Chinese National Government.

In addition to speeding development of her crude-oil production, China is also starting a program for the conversion of tung oil to motor fuel on a large scale. According to news dispatches from Chungkink, 25 refineries are included in the program. These are small units dispersed so as to render them less liable to air attack.

Axis Partners Planning New Development in Albania

Monthly crude-oil production in the Devoli district of Albania was roughly 13,000 metric tons (approximately 87,000 bbl.) during the first quarter of 1942, according to reports. Authorities hope that production can be increased through exploitation in Patos.

Italians and Nazis are reported to be hoping that 1,200,000 tons of petroleum can be obtained during the next 10 years from the Patos district. The oil fields in the district have an area of 450 ha. (1,125 acres), and production sands are between 300 and 1.000 m. (975 to 3,250 ft.).

Pan American Highway Is Key To Wartime Transportation

(Continued from Page 103)

omies of our sister American republics. The new sailing ships project, too, could be dovetailed into this program. Such ships could pick up truck-collected cargoes which would have typing up larger and more valuable freighters. If the sailing ships confined their operations to the Caribbean and the Gulf, they too could be partially protected and even the loss of a few would not be very serious.

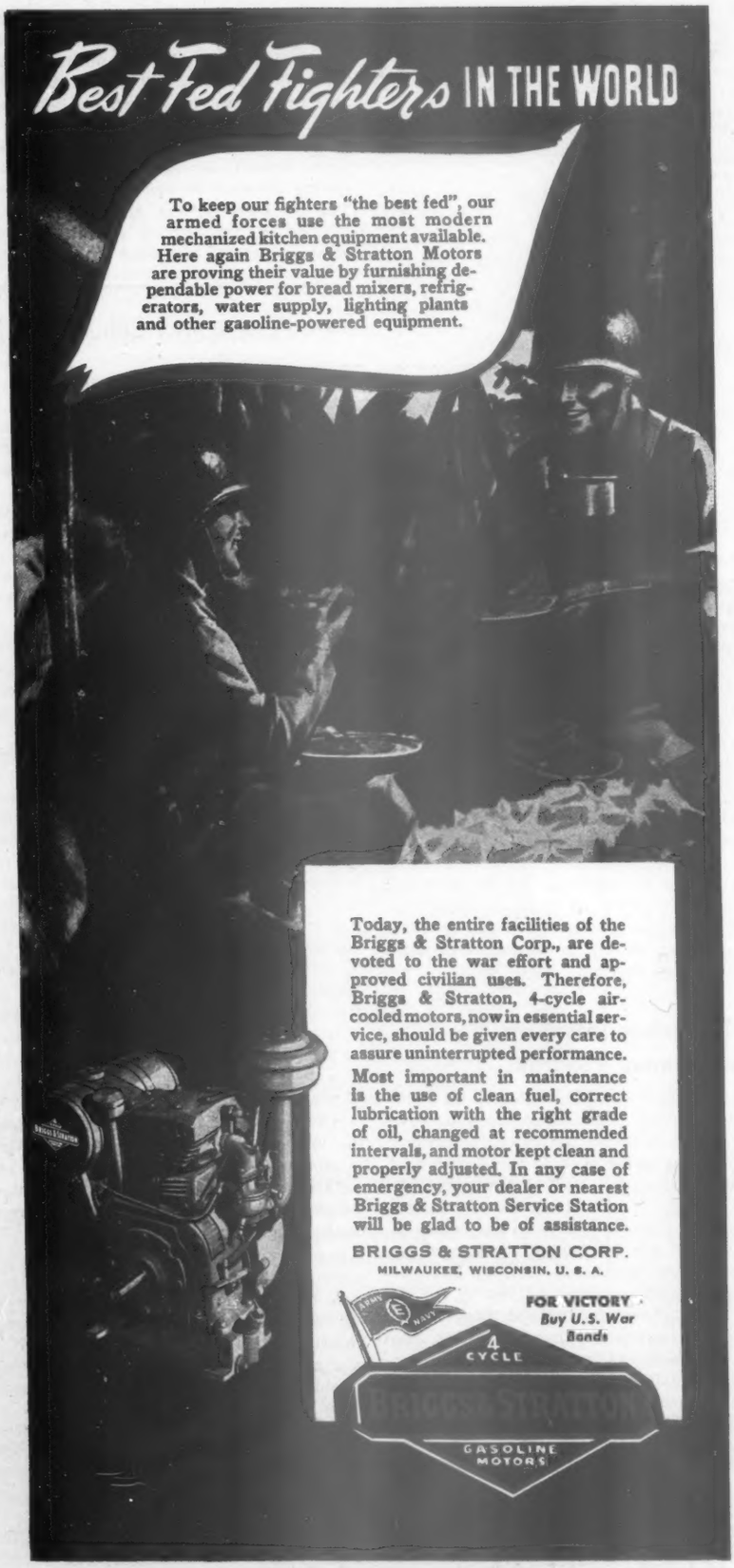
These grave developments affecting transportation formed an important part of the deliberations of the Conference of American Foreign Ministers held in Rio de Janeiro, Brazil, last January, the successful culmination of many years of sincere, diplomatic effort toward unity and cooperation with the other Americas on the part of the president and the State Department. At this conference the representatives were aware that the realistic and basic foundation for a cooperative inter-American program rests on transportation from which the pyramid of economic, cultural, political, and perhaps military cooperation rises. The final act of the conference embodies a resolution recommending that the Americas "speed up the construction of the unfinished sections of the Pan American Highway and the improvement of sections already constructed so as to provide transportation in the hemisphere and permit the development of American and domestic commerce, connecting centers of production with centers of consumption . . ."

Development of the Pan American Highway as the "lifeline of the Americas" should prove of inestimable value in the international effort to maintain a continuous flow of raw materials to United States war industries and a return flow of essential goods to the other Americas.

Noteworthy in this program is the coming vital movement of crude rubber to the United States from the Amazon Basin and other rubber-producing regions in South America. And again, in the implementation of our "Good Neighbor" policy, now so seriously hampered by wartime shortage of shipping, the Pan American Highway looms large as a major support.

In the possible event of attack or damage to the Panama Canal, the experience gained in moving supplies over these various alternative routes would have immediate enormous military, economic and political importance.

The bitter score against us is more than 500 ships sunk. Are we short of gasoline, sugar and coffee? Do our war industries face stoppage for lack of imported critical raw materials, such as copper, manganese, bauxite, mica, nitrates, tin and vegetable oils? Are economic troubles developing in the other American republics? Ship sinkings are the cause and a cure must be found.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Latin-American Oil Has Brilliant Future

(Continued from Page 59)

tees are performing in patching up and somehow keeping the South American oil industry operating to as large an extent as possible, there has been, of necessity, unavoidable disappointment and dissatisfaction. But this very disappointment and dissatisfaction is responsible for the emergence of a brighter future for South American oil.

The great loss of oil revenues in exporting countries and the drastic cuts in importing countries, with their resultant hardships, have focused a strong light on the very essence of the oil problem in South America—a controversial issue which has presented increasing difficulties to the South American governments and oil companies during the past few years. Simply expressed, the issue is what the nations should receive in profits and benefits from the exploitation of their petroleum. Upon the satisfactory solution of this problem depends the future of South American oil development.

In South America the rights to the subsoil are not owned by the individual land owner as in the United States but with very few exceptions the subsoil riches belong to the nations, that is, the federal governments. Concessions are granted for the right to explore for and exploit the oil, and the governments retain a certain percentage of production as its royalty. In South America's early oil days concessions were freely granted for small royalties as oil possibilities were uncertain and the industry itself was in its infancy. When some of those concessions, such as the ones in Venezuela, proved to be fabulous producers of oil, the feeling began to grow that the governments were receiving too small a share. As great oil wealth poured out of the countries, the governments and their people began to feel that too little, by comparison, remained within their borders for their own enrichment and development.

New laws were made for new concessions so that the governments' share would be larger in future developments. Greater labor benefits were demanded and received. In some cases the laws were so radical that they prevented any future development at all, as oil companies would not consider operating under such stringent conditions. Law suits were filed by governments against companies and vice versa. In Bolivia, misunderstandings became so intense that in 1937 the government expropriated Standard Oil Co. of New Jersey's properties. A year later, Mexico followed suit and expropriated all oil properties with the exception of Gulf Oil Corp., which had managed to maintain amicable relations.

Argentina's national oil company was given such powers and advantages that it is practically impossible for foreign oil interests to compete in developing new properties. Oil operations in Colombia became so enmeshed in legal technicalities that it takes almost 2 years to obtain a permit to even drill an oil well. New oil development in Venezuela reached a standstill due to legislation which oil companies considered adverse.

Those South American countries with no production but which hoped for exploration of their possibilities saw the difficulties in which their neighbors were laboring so they took the most radical stand of all. Brazil and Chile inaugurated legislation which completely prohibited foreign oil interests from exploring for oil. Paraguay refused to entertain bids for exploratory concessions, preferring to bide its time until it could decide the wisest policy for opening up the country for exploration.

The oil industry in South America had reached

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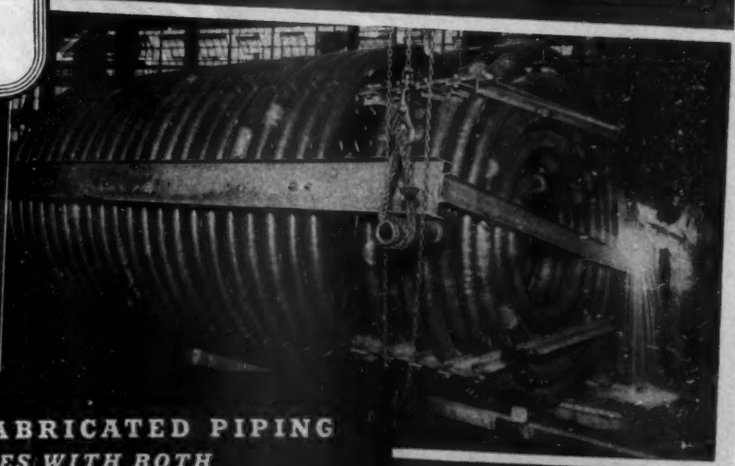

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an ominous impasse when war came. Prior to the war the U. S. Government, occupied primarily with internal affairs, made little attempt to guide foreign oil policies of its nationals, nor did the companies ask for assistance. But the wartime U. S. Government suddenly found itself responsible for seeing that South America was supplied with petroleum products and determining what and how much equipment could and should be sent for development purposes. Realization came of the importance of South American oil in Western Hemisphere policy as well as the world picture. In discussing with the South American governments their pressing immediate needs of oil supply and equipment, the real problem of development began to take shape. The South American delegations to Washington talked policy for the future as well as tons of steel and barrels of oil for the present. For the first time, the problem was being brought forward in all its angles as one which fundamentally must be dealt with government to government.

As a result, the governments of the other American republics are requesting the U. S. Government to work with them in formulating definite policies and programs for future development. Venezuela, Paraguay, Brazil and Mexico are already hard at work. Delegates are flying back and forth between the countries. Surveys are being made. Conferences are being held. It is still premature to announce specific programs and policies. The important news is that it is in the process of accomplishment, and with enthusiasm on all sides.

Although nationalistic policies are as strong as ever and all companies now know that their future operations must be based upon the respective countries receiving a larger share of the petroleum wealth, the problems which were deadlocking development are on the way to being solved equitably and amicably.

The South American governments fully appreciate the vital part in their development oil has played in the past, for vast new areas have been opend up for settlement and roads and communications established to them which are invaluable in the countries' over-all development. The great numbers of workmen employed have been introduced to a new standard of living, which is changing them physically as well as developing them from an educational viewpoint. For example, the new generation of oil workers in Lake Maracaibo, Venezuela, are taller, weigh more and are stronger by actual scientific records than were their fathers who first started to work for the oil companies.

Nor do the South American governments underrate the difficulties of oil development in the tropics, where the majority of South America's oil is to be found. They know the fight the oil companies must make through wild thick jungles, how they must wrestle with tropical diseases, build their own roads, solve their own supply problems and even in some cases ward off hostile Indians. They realize the oil companies must build houses for all their employes and laborers, provide hospitals, recreational facilities, schools, churches, commissaries. They must take nationals who have never handled machinery more complicated than primitive farming equipment and teach them to be drillers, machine-shop workers, pipe liners, refinery workers, truck drivers, etc.

Most of all, the South American governments fully appreciate that foreign capital and foreign technical talent are essential to the complete development of Latin America's oil possibilities.

National Claims Recognized

On the other hand, the oil companies now realize that in order to play a part in this development, the new economic basis under which they will operate will provide for a greater portion of profits and benefits to remain within the countries to develop them along other lines. In line with this policy, the oil companies plan to invest part of their oil profits in developing other industries and natural resources.

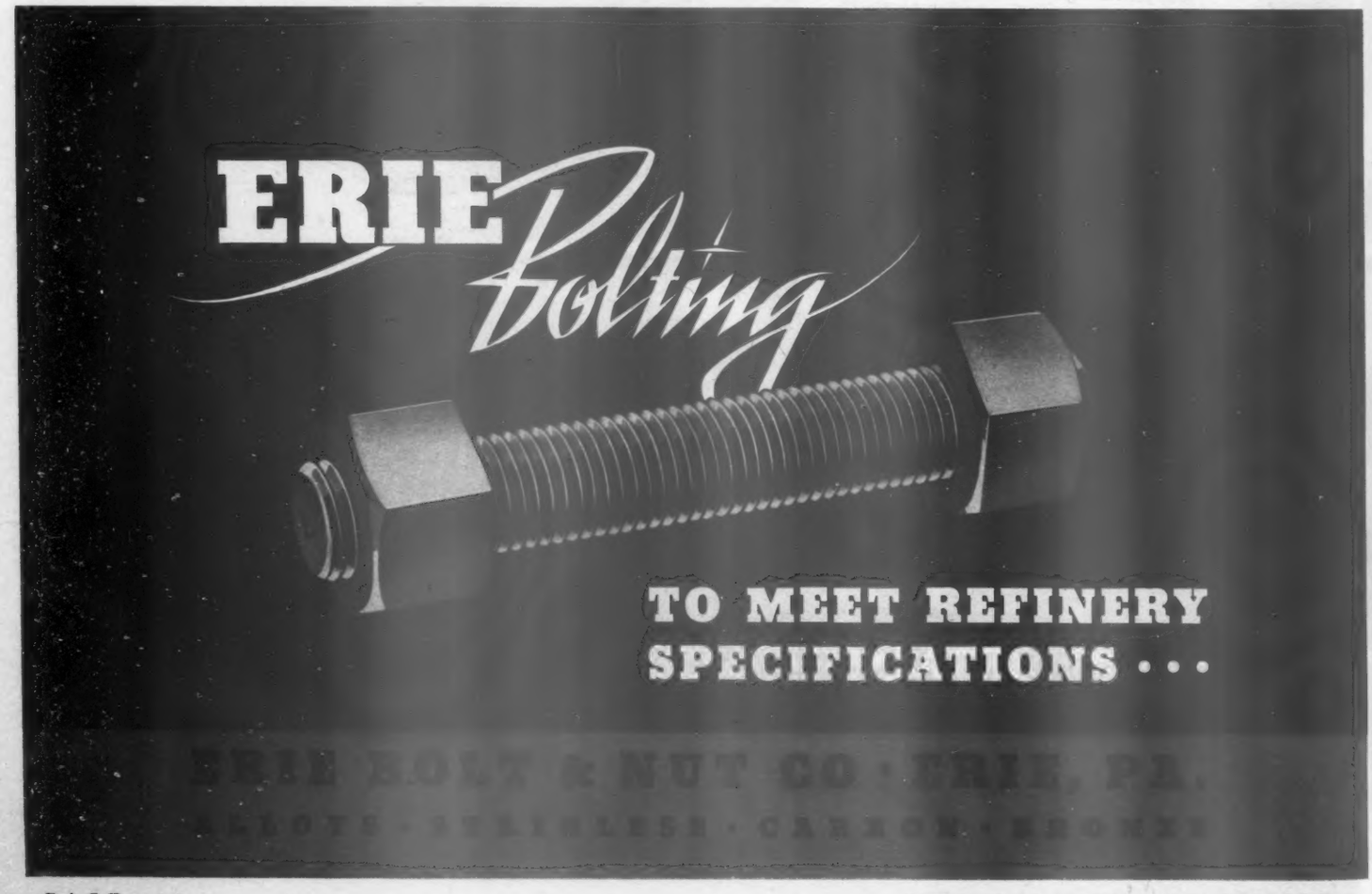
The exact percentages, the way this will be handled, the specific laws and conditions under which this development will proceed, in other words, the mechanics of the new blueprint, are being worked out now with every indication of ultimate success.

In order to establish closer contact between governments, petroleum attaches were assigned to American embassies in Brazil, Mexico, Venezuela, Uruguay, Argentina, Chile, Colombia, Cuba, Haiti, Dominican Republic and plans are being made to assign men similarly qualified to the other countries where their duties are not only to assist in working out immediate problems but those of the future as well.

It is not too early to predict that oil in South America after the war will undoubtedly see a great boom. The constantly accumulating geological and exploratory reports indicate that the surface has only been scratched in the search for South America's oil. South American reserves and potentialities will probably assure the Western Hemisphere of continued dominance of the world oil picture.

The areas which hold real promise and will lure the drill once it is possible to obtain exploratory equipment and national regulations are properly adjusted are vast new areas in central and eastern Venezuela; the "llanos" of Colombia, north of Bogota; the "Oriente" or great jungles east of the Andes in both Ecuador and Peru; the southern part of Chile; southern and western Argentina; middle eastern Brazil and the upper reaches of the Amazon.

There is no question but what independents, who have heretofore played a very minor role in South America, will become a more important factor in the new development. There is room and opportunity for competition and the work now being done will assure sound economic bases under which to operate.



Trouble With Oil Supply Turns Britain to Alternate Fuels

By G. W. L. DAY

DEVELOPMENT of alternative fuels to replace gasoline for motor vehicles has always tended to be slow, because of the high degree of efficiency and the availability of gasoline itself. Until the exigencies of war threatened her oil supplies in World War I Britain was, on the whole, loath to look beyond the gasoline pump. One of the few exceptions on record is of trams in Blackpool and Manchester, which ran on internal-combustion engines using gas containers at relatively low pressures.

The formidable U-boat campaign of 1914-18 at last gave a fillip to gas traction, and by 1916 a Thornycroft single-deck motor bus, fitted with a gas bag for town's gas, began running between Beeston and Nottingham. Before the war ended, no less than 5,000 permits had been issued by Britain's Board of Trade to vehicle owners to enable them to obtain gas supplies for running their autos. The somewhat crude system of low-pressure gas bags carried on the roof, refilled from standpipes along the main roads, gave a mileage of from 8 to 20 miles on a single charge.

Subsequent research work developed pressure-storage chambers of the rigid type and rubber fabric high-pressure bags in which gas could be stored at pressures around 150 lb. per sq. in. Later still, steel bottles made from low and medium carbon steel, similar to those used for transporting oxygen and hydrogen, were manufactured but were found excessively heavy. Eventually a special steel-alloy bottle was produced which allowed a working pressure of about 3,000 lb. per sq. in., so that a considerable quantity of gas could be taken aboard without undue increase of weight.

Investigation of Gas as Fuel

In 1932 the depression revived interest in the question of gasoline substitutes, and the Birmingham Gas Co. decided to make a complete investigation into the possibilities of gas as a fuel for traction. A large amount of research work was carried out, including the development of compressed-gas technique, the use of mixed gases, supercharging, and even special engine modification. This work has largely governed the evolution of the gas container up to the present day.

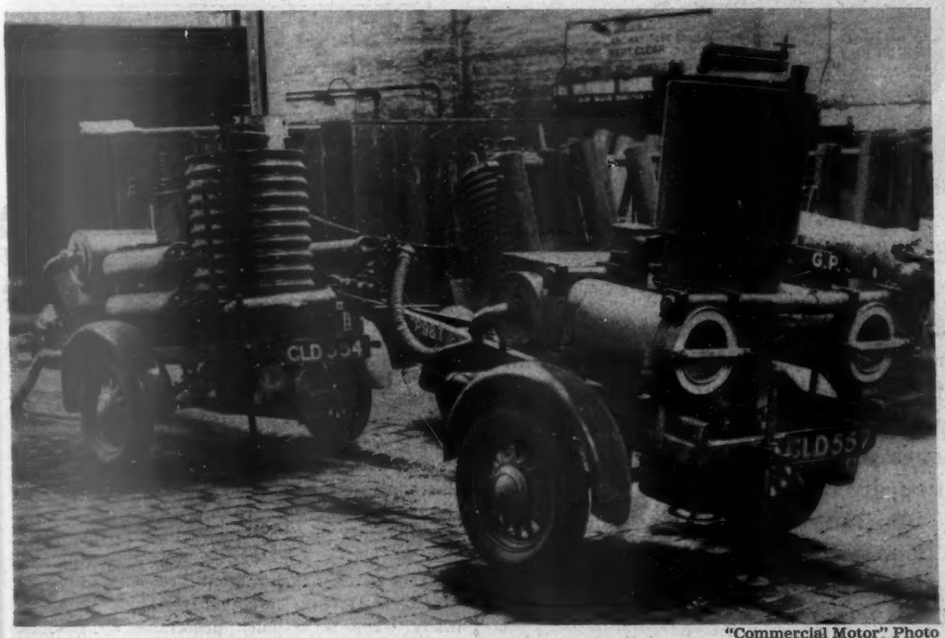
It has been found that the power and thermal efficiency of an internal-combustion engine varies widely with the different fuels used, and that in general the performance depends chiefly on the calorific value per unit volume of charge, but also, in a lesser degree, on the composition of the products of combustion, the volumetric efficiency and the rate of pressure rise. Experiments have shown that a town's gas-air mixture drawn into the cylinder has only 88.3 per cent of the calorific value of a corresponding gasoline-air mixture. The optimum power output is therefore of this order, but by introducing specially designed velocity tubes to accelerate the combustion during the early stages an actual power output of about 90 per cent that of gasoline may be obtained.

The loss in power when running on gas results in a lower acceleration, but this can be improved by increasing the compression ratio. A series of tests were made recently on two six-cylinder single-deck buses, one running on gasoline and the other on town's gas. The gas bus originally had the standard compression ratio, which was afterwards increased to 6.7:1. Fig. 1 shows the results of the acceleration tests. The improvement when the compression ratio was raised is clearly marked.

Gas and Gasoline Equivalents

Allowing for losses during filling and so on, tests have shown that 1.3 to 1.4 therms of gas are equivalent to 1 gal. of gasoline. Experiments carried out on a small compression ignition oil engine, modified so as to allow the injection of gas, proved that with a compression ratio of 16:1 the power output with gas was slightly greater than that obtained with fuel oil, the heat intake with both fuels being about the same.

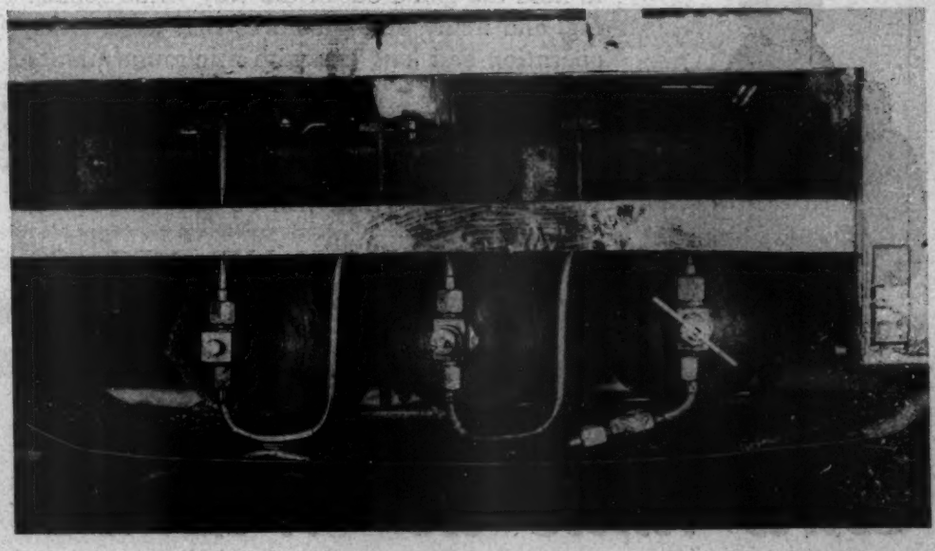
A great deal of work was also carried out on the use of composite fuels. Dr. J. Rifkin, in researches at Birmingham University, showed that



"Commercial Motor" Photo

Left: B.C.U.R.A. and G.E.P. units. The former has hollow coolers. Cross bars over their ends operate internal cleaning plates. Both plants have filters and wet blast

Below: Method of attaching cylinders to truck chassis and charging valve through which refueling is accomplished



by injecting a certain quantity of gas with the air charge during the suction stroke of a compression-ignition engine, a corresponding reduction in the heat input in the form of fuel oil can be brought about, thus proving that a considerable amount of the fuel oil can be replaced by gas. In this case the oil fuel acts as a source of ignition of the charge, air-gas mixtures alone not being self-igniting.

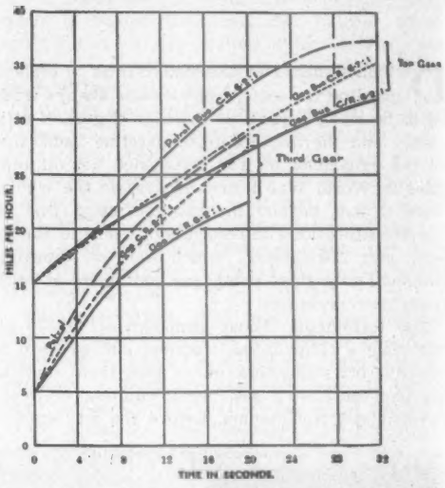
The results showed that the brake thermal efficiency of the composite fuel was lower than that of oil alone until nearly full load was reached, after which at full and overload there was a substantial increase in thermal efficiency. Town's gas is therefore of wide practical application to the propulsion of road autos in emergencies such as the war.

Another gas which although even more suitable for internal-combustion engines has not yet been extensively used is methane. Methane has a low velocity of combustion and can be used with high compression ratios, it is exceedingly clean in use and leaves little carbon deposit in the engine. The sources from which methane may be had are first, sludge gas from sewage, second, town's gas or coke-oven gas by catalytic methods, third, blow-holes in coal mines, and fourth, natural sources associated with the production of shale oil.

Methane First Used in 1921

Probably the first time methane was used in an internal-combustion engine was in 1921 when digestion tanks were employed in connection with the treatment of sewage in Birmingham. An engine, runinng on methane for power generation, was installed at a sewage-disposal works, and this is thought to be the first of its kind in the world. Later, a much bigger power unit was set up, and the use of methane for the generation of electricity has continued to develop to this day, when well over 4½ million units are generated annually.

After World War I, German scientists did further research on liquefied methane in the course of producing hydrogen from coal gas by the Linde-Bronn process. Methane in the liquefied state is obtained in this process together with ethylene, ethane and small quantities of acetylene. These are more easily ignitable gases, and increase the efficiency of methane as a motor fuel. Methane gas used as a motor fuel contains



Charted performance characteristics of gas and gasoline

about 82 to 83 per cent of methane and 14 to 15 per cent of heavy hydrocarbons, chiefly ethylene, apart from other substances to be found in coke-oven gas.

The principal storage advantage of methane over other gaseous fuels is its thermal concentration due to its high calorific value. Also methane at high pressure does not obey Boyle's law. At a pressure of 3,000 lb. per sq. in., the product *PV* is decreased by 23 per cent, which means that a greater volume of free gas can be stored as compared with town's gas at the same pressure. Taking an ordinary standard vehicle cylinder of 1.76 cu. ft. water capacity and using town's gas of 475 B.t.u. per 1 cu. ft., it is found that at 3,000 lb. per sq. in. its capacity in gasoline equivalent is 1.1 gal., whereas with methane the corresponding figure is no less than 2.85 gal.

Methane is therefore likely to come more into the limelight as a motor fuel. Scientists employed by the British Government are conducting research work into liquefied methane, which in many ways is actually preferable to gasoline, and in certain oil-drilling operations the potential supplies of methane are said to amount to the order of 1,000,000 cu. ft. a day.

As regards methane derived from sewage-disposal works, the approximate composition of the sludge gas is 70 per cent methane and 30 per cent carbon dioxide. The gas usually contains small quantities of hydrogen sulfide, which must be removed, as it will affect the storage bottles and the engine. The greater part of the carbon dioxide can be eliminated either by chemical means or by dissolving it in water. If the latter method is used, the gaseous mixture is washed under pressure, thereby reducing the proportion of carbon dioxide to 5 per cent or less.

Solid fuels which are used in gas producers for road traction are charcoal, anthracite, low and medium-temperature coke, and activated high-temperature coke. Except in a few districts where charcoal can be prepared locally, this fuel is not available in Britain.

The first and most important characteristic which a fuel must possess is high reactivity, because the conditions of road transport make it

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necessary for the producer to generate gas quickly after long stoppages. With an insufficiently reactive fuel it may be difficult to start the fire and maintain the fire bed in the producer at a high-enough temperature to generate good gas.

A figure used for measuring reactivity is known as the "critical-air-blast" value (C.A.B.), which is the minimum current of dry air required to maintain combustion under standard conditions of an ignited sample of the fuel.

TABLE 1—THE C.A.B. VALUES FOR TYPICAL CLASSES OF FUELS

Fuel—	C.A.B.
Wood charcoal	0.01 (below)
Low-temp. coke	0.01-0.03
Bituminous coal	0.02 (about)
Anthracite	0.034-0.04
Gas coke	0.05 -0.07
Coke-oven coke	0.065-0.085

Experiments have shown that the low-temperature cokes and anthracites are sufficiently reactive, but that normal gas and furnace cokes are not. However, reactivity can be increased considerably by activating the coal used in carbonization with sodium carbonate, and in this way cokes of 0.025 to 0.030 C.A.B. can be produced. High-temperature coke, as in the case of the Wales set, may be activated by treating the coke itself with sodium carbonate. Activation of the fuel increases the flexibility of operation of the producer, and also the range of fuel which can be utilized.

Size and Size Grading

A second important consideration is the size of the fuel, since size grading influences the time of contact with the air and fuel. In general, the fuel should be as small as possible, and in order to avoid channeling, uniform in size grading.

On the other hand, since the producer gas set works by engine suction, the resistance of the fuel bed sets a definite lower limit to size, depending to some extent on the type and dimensions of the producer. The Producer Gas Fuels Committee recommend a maximum size of ¾ in. and a maximum size ratio of 3 to 1. They have also recommended 3 per cent as the largest tolerable proportion of material below 0.1 in. in the fuel. Excessive fines cause a high-pressure drop across the producer and an undue amount of dust in the raw gas.

One of the chief bugbears of producer-gas traction is clinkering, which depends partly on the fire-bed temperature of the fuel and partly on the amount and nature of the mineral matter present. Sometimes producer-gas units clinker up with a mass of partially burnt fuel encased in molten ash. When fabric filters are used, specially dried fuels must be obtained, but these are expensive. Sets using wet washers can generally employ undried fuels, provided the surface moisture does not exceed 5 or 6 per cent.

Impurities in Fuels

Most British coals have a sulfur content of between 0.6 and 1 per cent and sometimes even more. The majority of this impurity is present in the producer gas, but a proportion can be removed by suitable water washers. Nitrogen is undesirable, because it forms ammonia; so are chlorides, because sodium chloride and ammonium chloride are corrosive agents, difficult to arrest in dry filters.

Freedom from an excess of tar is even more important, though defects in this direction may to some extent be remedied by the use of downdraught producers. Tar in the raw gas is more difficult to remove than dust, and will pass through the gas-cleaning system into the engine, where it gives trouble with the valves. On this account it has been laid down that fuels showing more than the merest traces of tar should not be used.

Finally, a good fuel should not be easily abradable or liable to shatter, and it should be of reasonably high bulk density so as to make possible a fair mileage per hopper charge.

Progasite and Oco

Two specially prepared forms of anthracite which should be mentioned are Progasite and Oco. Progasite, which is widely used, is a hard anthracite of high bulk density, grades ⅝ in. to ¾ in. Oco is anthracite dust, treated by a high-voltage electrical process and briquetted. There are large quantities at the South Wales pitheads.

The most serious technical difficulty in the use of these fuels is the removal of the dust from the gas, prior to its entry to the engine. Many types of filters have been tried, some wet, some dry, others combinations of both types.

The latest types of semidry filter remove practically the whole of the dust and show cylinder wear figures of the same order as those obtained with gasoline.

Most Suitable Solid Fuels

The two outstandingly suitable solid fuels, which are available, for gas traction are anthracite and activated coke. The first has the advantage of high bulk density, cleanliness and low tar content, good volatile content, a sulfur percentage below 1 per cent and ash characteristics giving a minimum of trouble in clinkering. Its main drawback is the restricted location of supplies.

Low-temperature cokes, on the other hand, are not always so uniform in their properties, but usually they are very reactive and give an excellent performance. In spite of low bulk density most low-temperature cokes give a sufficient mileage on one hopper's charge for a full day's work.

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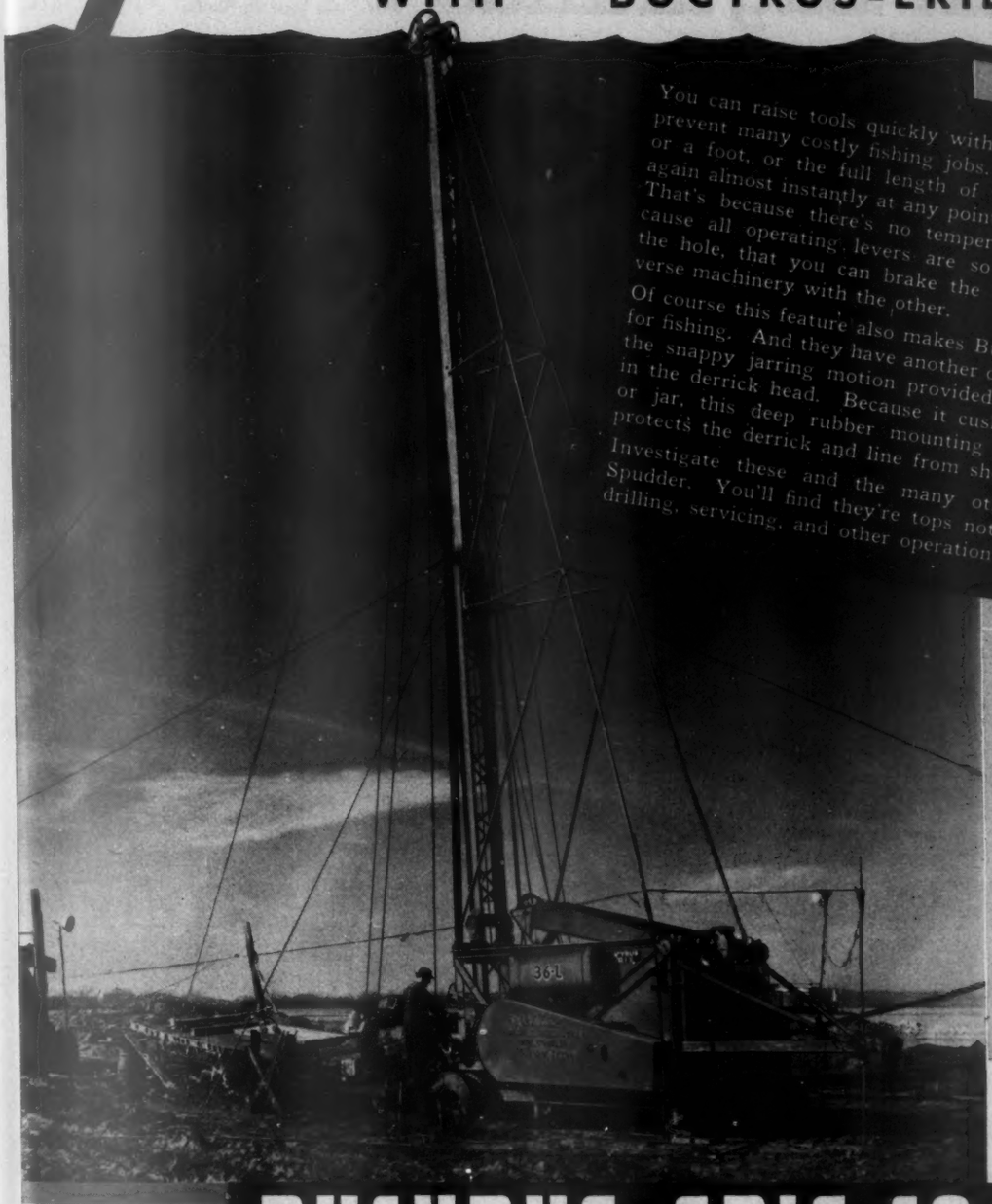

You can raise tools quickly with a Bucyrus-Erie Spudder and thus prevent many costly fishing jobs. You can raise tools just an inch, or a foot, or the full length of the hole, and then start lowering again almost instantly at any point — all without the aid of a helper. That's because there's no temper screw to bother with; and because all operating levers are so conveniently arranged, close to the hole, that you can brake the bull reel with one hand and reverse machinery with the other.

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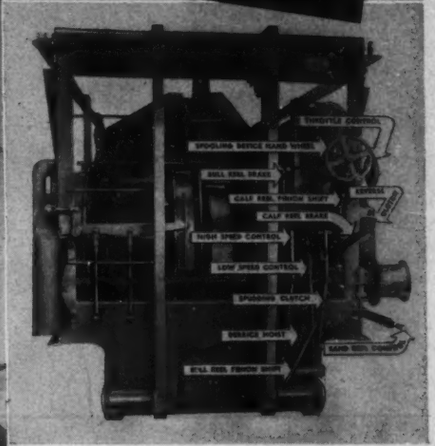

You'll find that the convenient arrangement of controls on a Bucyrus-Erie saves plenty of time . . . and grief. They're all grouped together, close to the hole, where you can grab them quick when trouble starts.

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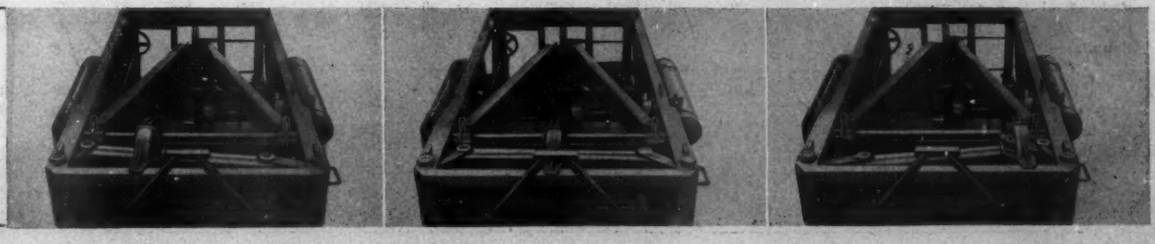

Care Lengthens Service Life Of Rods In Lagunillas Field

By W. B. HOPKINS
Engineer, Mene Grande Oil Co., C.A.

MARACAIBO, Venezuela.—The portion of the Lagunillas field exploited by the Mene Grande Oil Co. consists of a narrow strip in Lake Maracaibo approximately 0.4 mile wide by 12.5 miles long. All of the parcels are located just off shore in water varying in depth from 1 to 20 ft. There are 239 producing wells in the area, 235 of which are pumping with standing valve depths varying from 3,000 to 5,500 ft.

When it first became necessary to start beaming wells, service units were installed on each piling-supported derrick foundation. However, the completion of several installations soon made it evident that this would be a costly procedure, and as a consequence the "cleanout barge" was developed.

A cleanout barge is an 80 by 40 by 5-ft. steel barge on which the following equipment is arranged:

1 Double drum draw works powered by a 100-hp. diesel engine, located approximately at center of barge.
1 4½ by 10-in. pump powered by a gasoline engine.
1 Double drum winch powered by a gasoline engine, for handling anchors.
1 5-kva. light plant powered by a gasoline engine.
2 13-bbl. fuel tanks.

All motors, pumps, and other equipment are located behind the draw works, as the front half of the barge is used for a pipe rack. The barge with all equipment in place draws approximately 2 ft. of water. Four units similar to the one described are used for servicing the 235 pumping wells in the Lagunillas district. Barges are towed to all locations by company launches. Upon nearing a desired location, the two anchors on the rear are dropped and lines from the front of the barge are looped around fender piles which are driven close to the derrick foundations at the two corners of the V-side of the derrick. The barge then pulls itself up to the fender piles by use of the cat line.

As successful pumping operations are largely dependent upon service obtained from sucker rods, a procedure was established in an effort

TABLE 1—NUMBER OF ROD FAILURES

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	1941 Last half	1941 First half	1940 First half	1939 First half	1938 Last half	1938 First half
Number of failures:																		
1-in. body failures	...	...	1	...	1	...	...	...	...	...	...	...	...	2	1	2	...	4
1-in. pin failures	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	2	1
1-in. coupling failures	...	1	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	1
Total 1-in. failures	...	1	1	...	1	...	...	...	...	...	...	...	...	3	1	5	2	6
⅞-in. body failures	4	...	1	2	1	1	1	2	...	...	1	1	5	9	8	9	7	6
⅞-in. pin failures	...	...	...	2	...	1	2	1	...	...	1	2	6	3	12	13	11	11
⅞-in. coupling failures	1	1	...	1	...	...	1	1	1	2	2	1	8	3	6	5	11	6
Total ⅞-in. failures	5	1	1	5	1	2	4	4	1	2	4	4	19	15	26	27	29	23
¾-in. body failures	...	2	1	4	2	...	1	1	...	1	1	5	9	9	14	14	12	8
¾-in. pin failures	...	1	2	...	...	...	1	...	...	...	...	1	2	3	3	3	2	2
¾-in. coupling failures	...	1	...	...	...	...	...	...	...	...	1	...	1	1	2	...	3	2
Total ¾-in. failures	...	4	3	4	2	...	2	1	...	1	2	6	12	13	19	17	17	12
Total rod failures	5	6	5	9	4	2	6	5	1	3	6	10	31	31	46	49	48	41
Aver. 1-in. failures per month	...	...	...	...	...	...	...	...	...	...	...	...	0	1	0	1	0	1
Aver. ⅞-in. failures per month	...	...	...	...	...	...	...	...	...	...	...	...	3	2	4	4	5	4
Aver. ¾-in. failures per month	...	...	...	...	...	...	...	...	...	...	...	...	2	2	3	3	3	2
Aver. all rod failures per month	...	...	...	...	...	...	...	...	...	...	...	...	5	5	7	8	8	7

TABLE 2—PER CENT DISTRIBUTION OF FAILURES BY TYPE
(Based on total failures in each size rod)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	1941 Last half	1941 First half	1940 First half	1939 First half	1938 Last half	1938 First half
Distribution of failures:																		
Body of all 1-in. failures	...	...	100	...	100	...	...	...	...	...	...	...	...	67	100	40	...	66
Pin of all 1-in. failures	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	60	100	17
Coupling of all 1-in. failures	...	100	...	...	...	...	...	...	...	...	...	...	...	33	...	...	...	17
Total per cent failures, 1-in.	...	100	100	...	100	...	...	...	...	...	...	...	...	100	100	100	100	100
Body of all ⅞-in. failures	80	...	100	40	100	50	25	50	...	...	25	25	26	60	31	33	24	26
Pin of all ⅞-in. failures	...	...	...	40	...	50	50	25	...	...	25	50	32	20	46	48	38	48
Coupling of all ⅞-in. failures	20	100	...	20	...	...	25	25	100	100	50	25	42	20	23	19	38	26
Total per cent failures, ⅞-in.	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Body of all ¾-in. failures	...	50	33	100	100	...	50	100	...	100	50	83	75	69	74	82	71	67
Pin of all ¾-in. failures	...	25	67	...	...	...	50	...	...	...	...	17	17	23	16	18	12	16
Coupling of all ¾-in. failures	...	25	...	...	...	...	...	...	...	...	50	...	8	8	10	...	17	17
Total per cent failures, ¾-in.	...	100	100	100	100	...	100	100	...	100	100	100	100	100	100	100	100	100
Body of total failures	...	...	...	...	...	...	...	...	...	...	...	...	45	65	50	51	40	44
Pin of total failures	...	...	...	...	...	...	...	...	...	...	...	...	26	19	33	39	31	34
Coupling of total failures	...	...	...	...	...	...	...	...	...	...	...	...	29	16	17	10	29	22
Total	...	...	...	...	...	...	...	...	...	...	...	...	100	100	100	100	100	100

ROOTS FOR A NEW KIND OF RUBBER TREE

Photo courtesy of Standard Oil Co., of New Jersey

The sap of a new kind of "rubber tree" is now being tapped.

The Babcock & Wilcox Tube Co. is making and supplying the tubes for many of the "roots" of these "trees"—Croloy Seamless Alloy Tubes that carry the "sap" through processing from crudes to butadiene, styrene or other synthetic rubber ingredients.

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TA-1229

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COLD DRAWN CARBON STEELS

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TABLE 3—PER CENT DISTRIBUTION OF TOTAL FAILURES

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	1941 Last half	1941 First half	1940 First half	1939 First half	1938 Last half	1938 First half
Per cent failures:																		
1-in. body failures	...	...	20	...	25	..	...	...	...	...	...	...	...	6	2	2	...	10
1-in. pin failures	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	6	4	2
1-in. coupling failures	...	17	...	...	...	...	...	...	...	...	...	...	...	3	...	...	...	3
1-in. body failures, all types	...	17	20	...	25	...	...	...	...	...	...	...	...	9	2	8	4	15
⅞-in. body failures	80	...	20	22	25	50	17	40	...	..	17	10	16	29	17	18	15	15
⅞-in. pin failures	...	...	...	22	...	50	33	20	...	..	17	20	19	10	26	27	23	27
⅞-in. coupling failures	20	17	...	11	...	..	17	20	100	67	33	10	26	10	13	11	23	14
⅞-in. failures, all types	100	17	20	55	25	100	67	80	100	67	67	40	61	49	56	56	61	56
¾-in. body failures	...	33	20	45	50	...	17	20	...	33	17	50	29	29	31	29	25	19
¾-in. pin failures	...	17	40	...	...	..	16	...	...	...	...	10	6	10	7	7	4	5
¾-in. coupling failures	...	16	...	...	...	...	...	...	...	...	16	...	4	3	4	...	6	5
¾-in. failures, all types	...	66	60	45	50	.	33	20	...	33	33	60	39	42	42	36	35	29
Per cent total failures	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

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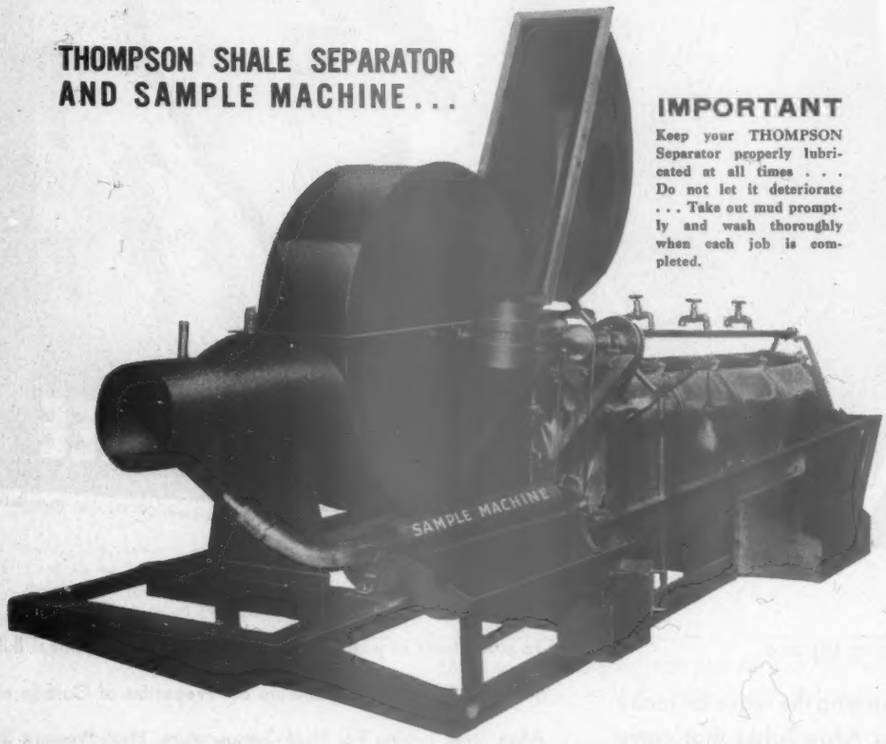

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to reduce to the minimum the number of rod failures caused by improper pumping speeds, poor counterbalancing, or improper size or location of pumps. A crew of men works continuously with a recording wattmeter counterbalancing wells. When a well is put back on production, after being off because of subsurface trouble, the wattmeter is used to determine if it is properly counterbalanced. It takes only a few minutes to make the necessary connections and obtain well load and counterbalance-load readings from the recording paper. If the two loads are not approximately the same, weights are added or removed, as the case requires, until the well is properly counterbalanced. In addition to the daily counterbalancing procedure, a survey is made once a year of the entire field to obtain a complete analysis of pumping characteristics. A recording wattmeter, a well weigher, and an echometer are employed in the work.

The total number of sucker-rod failures in the Lagunilas district during 1941 amounted to 62, of which 31 occurred during the first half, and 31 during the last half of the year. Of these, three were 1-in., 15 were ⅞-in., and 13 were ¾-in. failures during the first 6-month period, while 19 ⅞-in., 12 ¾-in. and no 1-in. failures occurred during the last half of the year. From Table 1 it may be seen that rod failures increased during 1938, and the first half of 1939, but that the average number of rod failures per month had been decreased from eight in the first half of 1939 to five failures a month during the entire year of 1941. From Table 3 it may be seen that of all failures during 1941, 9 per cent were 1-in., 55 per cent were ⅞-in. and 36 per cent were ¾-in. It may also be noted that the average per cent distribution of all failures since 1938 has been approximately the same as the distribution of failures during 1941.

Table 2 presents the fact that ⅞-in. rods were breaking at a faster rate in the bodies and couplings than in the pins during 1941, but that in the 3 years preceding, the greatest number of breaks occurred in the pins. In the ¾-in. size, as in the past, by far the greatest percentage of failures continue to occur in the body of the rods.

From the included tables and the above discussion, the following conclusions may be drawn as to the general trend of sucker-rod failures:

1. The total yearly number of rod failures is decreasing. The number of failures for both halves of 1941 were the same. However, these failures were 33 per cent less than in the first half of 1940.

2. The percentage of ⅞-in.-rod failures decreased from 58 per cent of all failures for the first half of 1940 to 49 per cent for the first half of 1941, but increased to 61 per cent of all failures for the last half of 1941.

3. From year to year the percentage of 1-in.-rod failures remains approximately the same.

4. The percentage of ⅞-in.-rod failures was 42 per cent of the total during both the first half of 1940 and the first half of 1941, but decreased to 39 per cent for the last half of 1941.

5. Of all failures, irrespective of rod size, 65 per cent were body failures, 19 per cent were pin failures and 16 per cent were coupling failures during the first half of 1941, while 45 per cent were body failures, 26 per cent were pin failures, and 29 per cent were coupling failures during the latter half of the year.

The greatest part of sucker-rod failures which have occurred are believed to be due to one of the following causes:

Body breaks (34 during the year).

Although every precaution is taken, it is difficult to transport and handle rods on over-water operations without occasionally bending one. When a rod is bent and straightened, small, invisible cracks may be formed which cause stress concentration and eventual rupture. Sufficient rods have not been available at all times to replace worn or damaged strings, and it has been necessary to rerun the defective string.

Coupling breaks (14 during the year).

Occasionally when a coupling is difficult to break, a hammer is used to loosen it. This procedure is strongly discouraged as hammering of case-hardened couplings often causes cracks which lead to early rod jobs.

Pin breaks (14 during the year).

Most pin breaks may be attributed to improper shouldering, and to an occasional lack of using the wire cleaning brushes with which all crews are supplied.

The rods used in the district are of the double-pin type with hardened and ground couplings. One deviation, however, has been made from the A.P.I. specifications and this consists in undercutting a fillet on the pin between the bottom-most thread and the face of the shoulder. This undercutting not only provides a small reservoir in which sand, mud, and other foreign materials may be safely stored in rod makeup operations, but it provides a better stress distribution within the pin itself. Undercut vs. nonundercut pins received rigorous testing when the Lagunillas field was pumping at its maximum rate, and after completing the installation of approximately 25 strings with undercut pins, they were made standard.

Recent developments in thread cutting, heat treating, and normalizing of sucker rods may make it possible to eliminate the extra machine work which the undercutting requires. However, Mene Grande has done no experimental work along these lines.

In general, the present downward trend of fluid levels and production rates indicate that the frequency of sucker-rod failures will continue to decrease. Where it was formerly necessary to employ 4-in. tubing pumps, the 2½-in. size on relatively slow short strokes are now used. The slowing down of the pumping units has had a tendency to reduce the number of failures, and as fluid levels continue their downward trend, more and more of the wells of the district will be pumping with slower speeds.

●

Private Oil Companies Lose Another Decision in Mexico

Another Mexican court has upheld the 1937 expropriation decree by which American and British oil companies were deprived of their oil holdings in Mexico. The latest decision was handed down by District Judge Ponciano Hernandez Ortega. It was regarded as the last recourse for the oil companies.

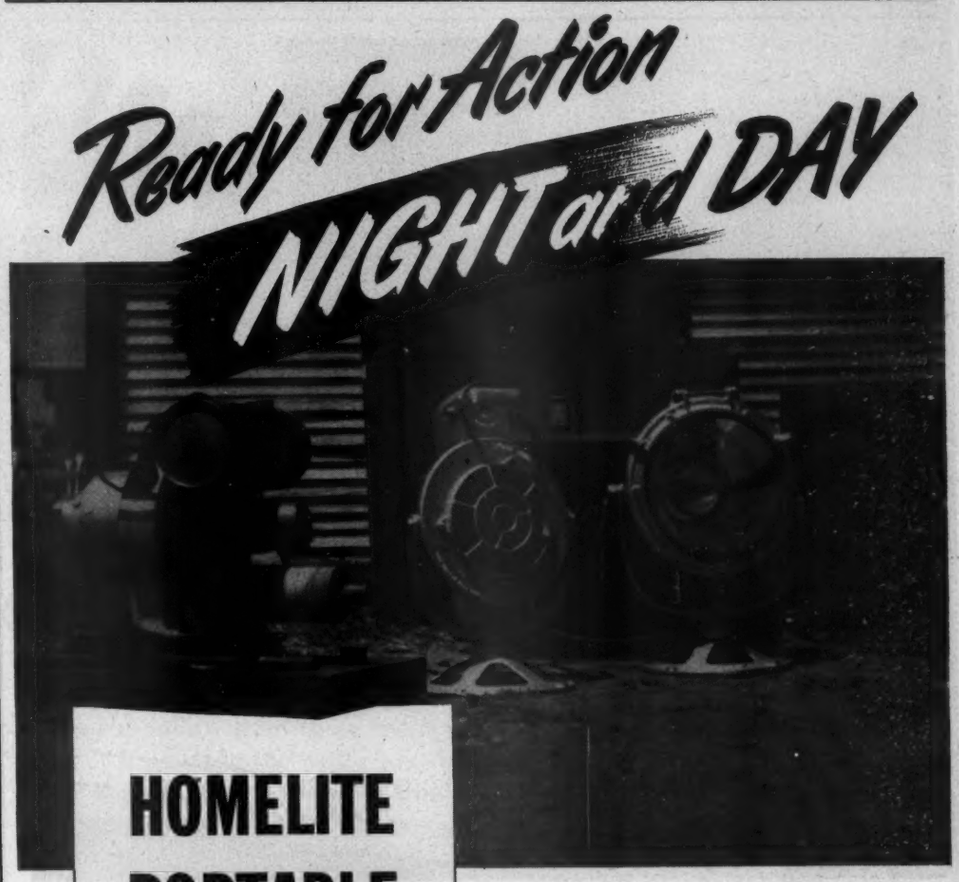
Judge Ortega ruled the expropriation constitutional in denying an injunction sought by El Aguila Oil Co., Royal Dutch-Shell subsidiary. He found that constitutional amendments forbid authorization of oil concessions and that other laws prescribe the manner in which subsoil resources may be developed.

Tres Bocas-Socuavo Wildcats Open New Colombian Production

The established production operations of the Petrolea field in Barco concession were abruptly halted early in the year by the practical cessation of export-crude movements in this portion of the Caribbean. Except for the small crude requirements of the concession refinery the work of the producing field and of the pipe line connecting it to seaboard has been limited to essential maintenance.

Although exploitation operations have been thus curtailed, the recent results of wildcat wells on the Tres Bocas-Socuavo structure, to the north of the Petrolea field have been somewhat encouraging. Two wells testing the Cretaceous overlying the basement, in the 9,000-ft. to 10,000 ft. range, found some distillate production. The first of these, 1 Socuavo, on the crest of the northern element of the structure is not rated as "commercial." However, the second Cretaceous well, A-2 Tres Bocas, about 8 miles to the south and somewhat westward of the crest, flowed over 1,000 bbl. per day. Two tests of the Tertiary sands, in the 4,000 to 5,000-ft. range, were also completed on the same structure. No. 2 Socuavo, on the west flank, about 4 miles north of 1 Socuavo, flowed over 200 bbl. per day of 35° A.P.I. oil. No. 3 Tres Bocas, about 22 km. to the south of 2 Socuavo and on the east flank, has pumped a smaller amount of oil mixed with water and appears to be at the edge-water line.

The sum of these wildcat results is inadequate for an appraisal of the prospects but they may be accepted as encouraging.



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Colombia's Casabe Field Showing Major Caliber

(Continued from Page 61)

port of crude oil started only in 1926, the figures in reality represent only 16 years of commercial exploitation. Deliveries to the Barranca refinery since 1921 amount to 30,892,595 bbl. Gasoline production during this period totaled 9,021,662 bbl., or 29 per cent of refinery deliveries.

In the Barco concession, the only producing field is Petrólea which was completely delimited by drilling during the first half of 1941. A total of 137 wells have been drilled on this structure of which 17 have been abandoned. The Socuavó structure, discovered during the past year, promises to develop into the largest oil field in Colombia. Two wells have been completed and 3 Socuavó was spudded on October 21. Surface casing of 11¾-in. was set at 507 ft. and as of November 15 it was reported at 2,404 ft. with some oil showings already reported. The oil of the Socuavó structure is high gravity. The first two wells produced 47.4° and 31.5° A.P.I. crude. Tres Bocas promises to be an important field, three tests having been made on this structure.

Barco crude exported during 1941 which averaged around 45° A.P.I., brought a weighted average price of $1.385 per barrel f.o.b. Coveñas export terminal. De Mares crude of 24.5° A.P.I. brought an average price of 96.5 cents per barrel f.o.b. Mamonal terminal. From September 1939 to July 1942, the Barco produced some 10,600,000 bbl. The refinery at Petrólea topped 62,680 bbl. of crude last year from which 31,419 bbl. of gasoline were recovered, or a 50 per cent yield. The latter is leaded to a 72-octane fuel and sold in the local market.

Upon cessation of present hostilities an intense wildcat program may be expected in the Barco, particularly in the Socuavó and Tres Bocas areas.

The Sagoc 261-mile pipe line has a potential capacity now of 25,000 bbl. per day and the original design of the line foresees, with additional pump stations, a throughput of as much as 70,000 bbl. per day, or 26,000,000 bbl. per year. Should the potentiality of this carrier be developed, Colombia's crude-oil exports may be doubled.

The author has estimated that possibly within 10 years Colombia's oil production may amount to 50,000,000 bbl. per year or just twice the output in 1941. These predictions depend on two factors, discovering oil in Colombia under favorable economic conditions, and secondly finding an outlet in the shrinking crude-oil market.

In the annual report to Congress of July 1942, the minister of mines and petroleum made some interesting remarks on the general aspects of the oil industry. Since 1931 to July 1942 and under the oil laws in force, the Government received 120 applications for oil concessions of which only 62, or 50 per cent, fulfilled the technical and legal conditions for acceptance. In 1939, the record of 32 applications was attained. The total area of all concessions solicited under Oil Laws 37 of 1931 and 160 of 1936 covers 2,900,024 ha. (acres multiply by 2.471). The area solicited represents only 15 per cent of the prospective oil land of the country which total the author places at 18,975,000 ha. Of the area solicited only 1,226,653 ha., or 42.5 per cent, retained sufficient interest to contract. As of July 1942, there were 846,440 ha. under contract with the Government, the balance having been surrendered either because of inability to fulfill all contract obligations or because of failure to discover oil in commercial quantities. Of the 846,440 ha. under contract 196,177 ha. are due to be surrendered. Consequently, of the 2,900,024 ha. originally considered most favorable prospective oil land only 650,263 ha., or 22.5 per cent, retain some interest. The result of 11 years' exploratory effort is the proving of the Yondó block (Casabe) of 46,880 ha., or 1.62 per cent, of the original area solicited. The actual size of the Casabe field is yet unknown.

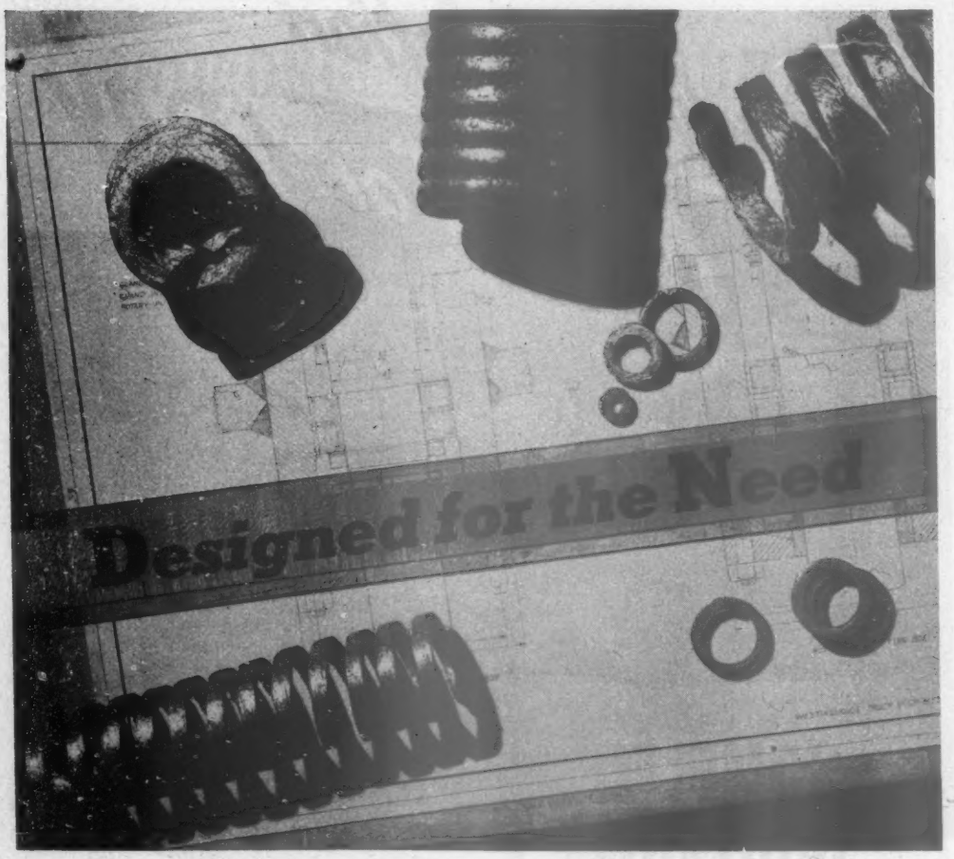
The oil minister stated that 1,454 wells have been drilled in the country, 1,293 of which have been productive and 161 dry. During the past 10 years a total of 2,132,424 ft. have been drilled of which 1,986,092 ft. have been in the De Mares and Barco properties and 146,332 ft. were drilled outside of these two concessions. The result of this drilling is the Casabe field and the Socuavó and Tres Bocas structures in the Barco. To gain an idea as to the investment this exploratory work represents, the three wells drilled by the Sociedad Nacional del Carare, a 50-50 venture undertaken by Colombian and American interests, cost the Carare company $1,800,000. The company is now in liquidation, having surrendered the tract found barren of oil. The data mentioned herewith is of interest to compare the experience of exploration in Colombia with data which Lahee publishes annually on the success of wildcatting in the United States. Offhand, the conclusions indicate that wildcatting is not as risky in the United States as it is in Colombia and, in addition, greater sums are exposed to the higher risk than in the United States.

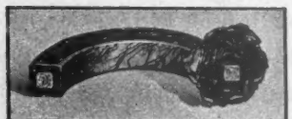
Oil Production Drops

Colombia produces 1.1 per cent of the world's crude oil. This small percentage is represented by the following figures for 1941:

	Barrels
De Mares concession:	
Crude 24.5° A.P.I.	20,471,899
Natural distillate	1,028,901
Total production	21,500,800
Barco concession:	
Crude 45.3° A.P.I.	3,904,246
Total oil production	25,405,046

Of the 1941 oil production 87.5 per cent was





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THE fight against evaporation losses of costly volatiles in the petroleum industry is waged through wartime and peacetime alike. Wherever and whenever volatile petroleum products are stored, protection against vapor loss is essential. One method of successfully combatting evaporation is the use of pressure storage tanks such as Hortonspheres, Hortonspheroids and Hemispheroids for large capacities, and horizontal and vertical "bullets" for smaller units. These tanks operate on the principle that no loss will occur as long as vapor does not escape from the tank. Instead of venting as the temperature rises, pressure builds up in these tanks until it is equal to the vapor pressure of the liquid. As long as this is below the operating pressure of the tank, no vapor will be vented out of the tank and no loss will take place.

The four Hemispheroids shown above are located at a well known Louisiana recycling plant and used for the storage of gasoline at a working pressure of 5 lbs. per sq. in. Two of them have a capacity of 20,000-bbls. each and the others hold 10,000-bbls. each.

Hemispheroids are built in capacities of 5,000 to 20,000-bbls. Noded Hortonspheroids are used for sizes up to 120,000-bbls. and pressures up to 20 lbs., while plain spheroids are built in capacities up to 30,000-bbls. for pressures up to 35 lbs. per sq. in. Hortonspheres are built in capacities of 1,000 to 20,000-bbls. for pressures up to 100 lbs. per sq. in. or more in the smaller sizes.

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HEMISPHEROIDS

exported and the balance consumed domestically. Taking the 1941 figures it is observed that the average monthly output was 2,100,000 bbl. Crude-oil production has dropped 90 per cent to 198,000 bbl. monthly, the figure for October last. Crude-oil production now is the equivalent to the domestic refinery requirements. The vertical drop which has been experienced during this year is shown by the following figures:

Pipe-line workers on the South American Gulf Oil Co. 12-in. pipe line waiting for a "go-devil" to arrive at this station on the system which runs oil from the Barco concession to Covenas on the Pacific Coast of Colombia. The line is now practically idle, pending resumption of normal export movement through Colombian ports

TABLE 2—COLOMBIA'S CRUDE-OIL PRODUCTION DROP DURING JANUARY-OCTOBER 1942

(Thousands of barrels)

January	2,213	June	786
February	2,336	July	469
March	1,296	August	379
April	1,072	September	348
May	1,121	October	198

Contrary to what was expected, the world conflict has brought about an almost total loss of oil exports from Colombia. Oil exports were valued at $23,114,375 in 1941 and in general they represent 24 per cent of the country's total exports. The significance of oil exports in the country's national economy, particularly in the payments made directly to the Government, may be appreciated by citing the data of the minister of mines and petroleum in his report to Congress in July. According to the report, the oil industry paid the Government the following sums: Royalties (De Mares): 2,194,750 pesos; Barco: 603,121 pesos; Andian pipe-line rights: 251,334; total: 3,049,206 pesos or $1,738,500. In addition, the comptroller reports that the oil industry paid 7,289,000 pesos in income-tax payments, or $4,150,000. These direct payments to the Government total therefore 10,338,206 pesos equal to 100 times the surface fees collected. Since the total fiscal income amounted to 80,000,000 pesos last year the oil industry's contributions represent 13 per cent for 1941. This does not include other taxes.

The loss of crude-oil exports means the loss of at least 90 per cent in royalty payments; a total loss of pipe-line shipments and rights accruing therefrom and a loss of the income and excess profits tax payments. In addition it means a reduction of personnel. Oil exports of the order of those of 1941 amounting to 22,184,690 bbl. are responsible for a low unit cost of exploitation which in turn makes it economically possible to sell refined products in Colombia under the New York and Port Arthur ceiling prices fixed by contract. Contrary to the opinion often expressed, that oil exports have no significance in the country's economy, the above data and comments point out that only oil exports make possible royalty payments, pipe-line rights, income-tax payments, maintenance of personnel in the industry, and the sale of refined products under ceiling-price limits. It is evident that these economic benefits could not accrue to Colombia's economy solely through the sale of refined products in the country. The president, in his message to Congress in July, recognized this and stated that the world conflict had caused a serious drop in oil exports and that its effects on the fiscal income and economy of the country were of serious concern for the immediate future.

Drilling Obligations

Table 3 lists the concessions now under contract covering 846,440 ha. or about 2,100,000 acres. The 20 concessions listed were granted under the provisions of Oil Laws 37 of 1931 and 160 of 1936. The first two tracts listed were studied both by surface geology and geophysical work. The findings revealed no suitable structure which warranted drilling a test well. The ministry held that in order to surrender the concessions the obligations of Article 24 of the oil law had to be fulfilled, namely, proof must be shown that oil has not been found in commercial quantities and that geological surface work and subsurface geophysical investigations were not sufficient proof of this. In view of the advances in the art of geophysical exploration since the oil law was passed and the extensive study made of these tracts which involved heavy expenses, the operators held that they had furnished adequate proof, moreover, that the oil law permitted the surrender of a concession at any time prior to the date when the obligation to install a drilling rig was due. In view of the difference of opinion it was decided to submit the entire matter to the Supreme Court. After a 2-year study, the court handed down a decision in September giving a strict interpretation to the oil law but at least made a suggestion that the later should be amended in view of the advances made in the art of exploration.

The right of surrender granted in Article 24 is subject to a condition, namely, the absence of oil in commercial quantities, which the court holds can be ascertained only by drilling inasmuch as geological and geophysical studies cannot reveal the existence or nonexistence of oil. The law does not grant an option to the operator of performing either geological studies or drilling, but calls for both. The operator assumes the obligation under the contract of a negative proof to show that

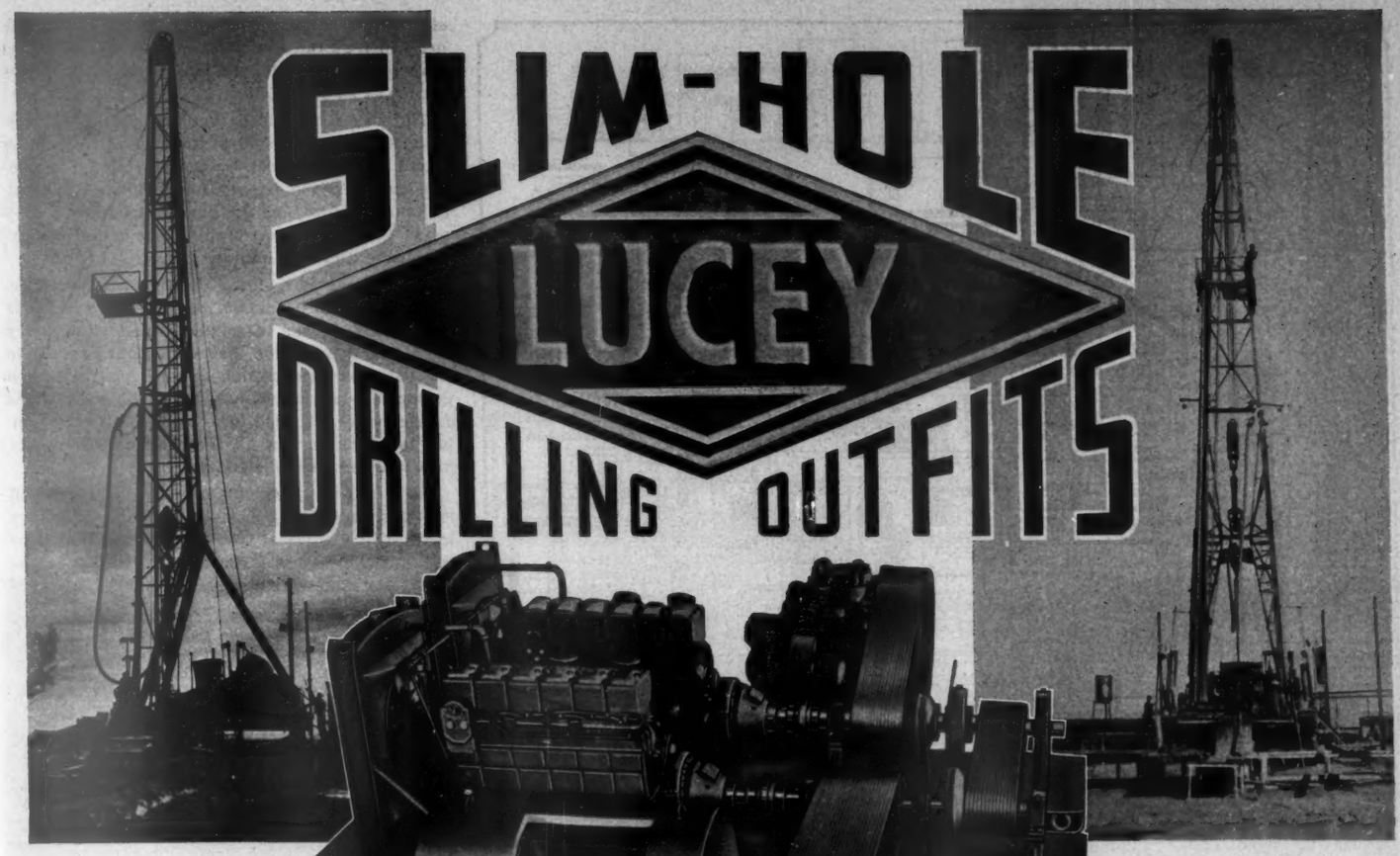
TABLE 3—OIL CONCESSIONS UNDER CONTRACT IN COLOMBIA UNDER OIL LAW 37 OF 1931 AND 160 OF 1936—AS OF JULY 1942

According to Report of Dr. Silvano E. Uribe, Technical Director of Ministry of Mines and Petroleum

	Area of grant in hectares (2.471 acres)	Department location	Date prior to which drilling rig must be installed	Status of concession—
1. Compania de Petroleos del Carare	49,745.1	Santander	September 15, 1940	Surrender pending
2. Compania Petrolera de Bogota	20,141.1	Atlantico	July 30, 1940	Subject to forfeiture
3. Cia. Colombiana de Petroleo El Condor	46,879.7	Antioquia	March 15, 1941	Drilling—fifth exploration year
4. Tropical Oil Co.	16,755.5	Antioquia	May 23, 1941	Surrender pending—drilled two tests
5. Pelaez Hnos. & Mora Hnos.	42,335.5	Santander	May 30, 1941	Subject to forfeiture
6. Cia. de Petroleo Shell de Colombia	99,975.0	Meta	February 10, 1944	In exploratory period—5 years
7. Socony-Vacuum Co. de Colombia	27,040.0	Santander	February 28, 1942	Surrender pending
8. Compania de Petroleos del Carare	20,520.0	Santander	November 24, 1941	Exploration—drilled one test
9. Carlos Botero Mejia	39,537.0	Santander	December 13, 1941	Exploration—third year
10. Francisco Rocha Vargas	3,383.0	Santander	December 15, 1941	All contract formalities not fulfilled yet
11. Cia. de Petroleo del Valle del Magdalena	32,879.8	Antioquia	June 17, 1942	Exploration—drilling second test
12. Cia. Colombian de Petroleo Sierra Nevada	42,569.1	Bolivar	November 20, 1942	Exploration—drilled 2 tests already
13. Richmond Petroleum Co.	100,000.0	Meta	December 26, 1944	Exploration—5 years
14. Cia. de Petroleo La Perla de Colombia	49,985.0	Magdalena	May 27, 1943	Exploration—3 years
15. Richmond Petroleum Co.	18,514.5	Magdalena	May 28, 1943	Exploration—3 years
16. Cia. de Petroleo Shell de Colombia	47,784.0	Magdalena	May 29, 1943	Drilling second test
17. Cia. Anglo-Colombiana de Petroleos	99,319.4	Meta	May 29, 1945	Exploration
18. Cia. de Petroleos La Estrella de Colombia	48,568.9	Magdalena	May 29, 1943	Exploration
19. Cia. Colombiana de Petroleo Occidental	15,121.9	Bolivar	September 26, 1943	Drilled 2 tests already
20. Roberto Pena	25,366.0	Bolivar-Ant.	October 10, 1944	Exploration
Total	846,439.9			

Note: An exploration period is granted in oil concession contracts, maximum 9 years for Magdalena Valley and Caribbean Coast grants and maximum 11 years for grants in the Llanos region. The initial period is 5 years for the Llanos and 3 years rest of country, after which exploratory periods of year to year are granted until maximum number of years is reached.

SLIM-HOLE LUCEY DRILLING OUTFITS



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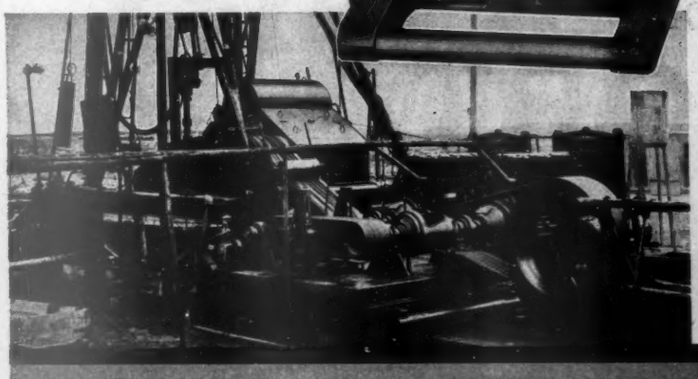

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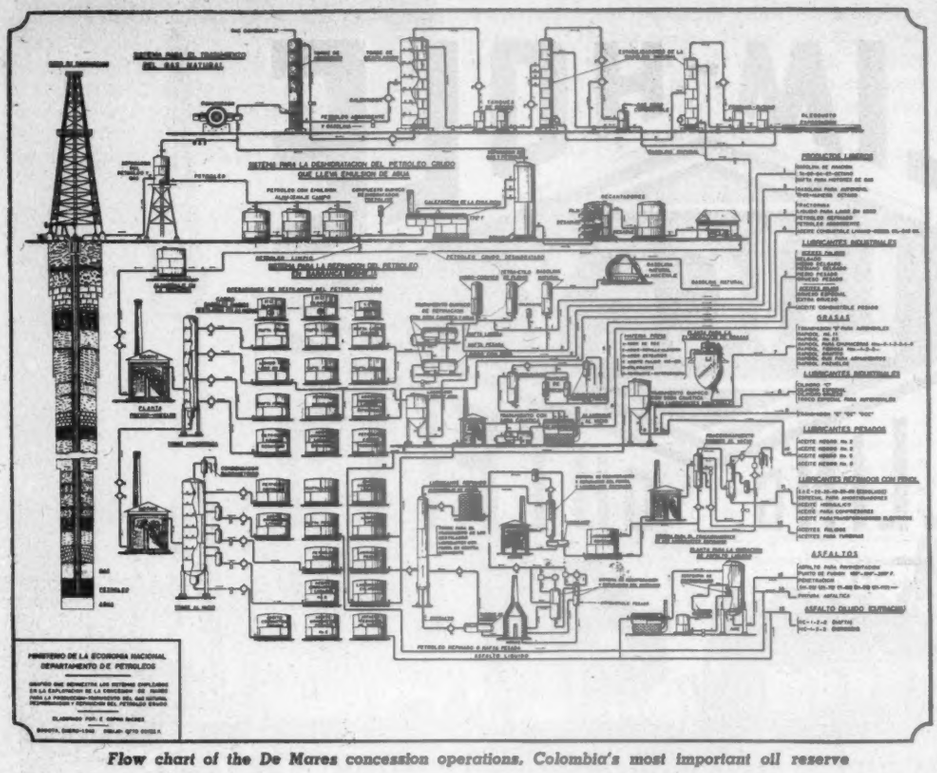

Flow chart of the De Mares concession operations. Colombia's most important oil reserve

oil does not exist in commercial quantities. The court does not define the latter.

The rights of surrender, reimbursement of the guarantee deposit, and the rights to remove all property of the operator from a concession are governed by the provisions of Articles 24, 25, and 47 of the oil law. If an operator does not find oil in commercial quantities the rights stipulated in Aritcle 24 accrue to him. However, if oil in commercial quantities is discovered he no longer has the option of surrender but is obliged by contract to proceed to exploit the concession. Otherwise he is liable to forfeit the grant. The ministry may invoke Paragraph 2 of Article 47 of the oil law which establishes the penalty of forfeiture. If the penalty is invoked, the surrender of the concession is governed by Article 25 of the oil law, under which all the immovable property on the tract reverts to the state and the deposit is not returned.

The court concludes that the penalty of forfeiture may be invoked in the case of not having found oil. This arises by the fact that the concession enters the exploitation period automatically upon terminating the exploration period of 9 or 11 years, or through failure to obtain an exploratory renewal in time.

The second part of the decision interprets Article 3 of Law 160 which permits the surrender of 5,000-ha. blocks after the second exploratory year. The court holds that such right accrues to the operator on condition that he has performed geological studies and has drilled on such tracts as are being returned. The same obligations apply to either part or all the tract and the latter may not be dismembered arbitrarily.

The court suggests an amendment to the oil law whereby drilling may not be made obligatory in lieu of geophysical studies. However, just now the court holds that a strict interpretation of the law is warranted in view of Colombia's oil legislation since 1919 which has been progressively more exacting giving oil contracts the seriousness needed for a proper development.

•

Venezuelan Government Will Receive Higher Oil Revenue

Foreign oil companies operating in Venezuela and the Venezuelan Government have reached an agreement whereby the state will obtain greater revenue from oil operations.

Details of the agreemnt were not disclosed and representatives of the companies participating in the negotiations have not yet returned to his country.

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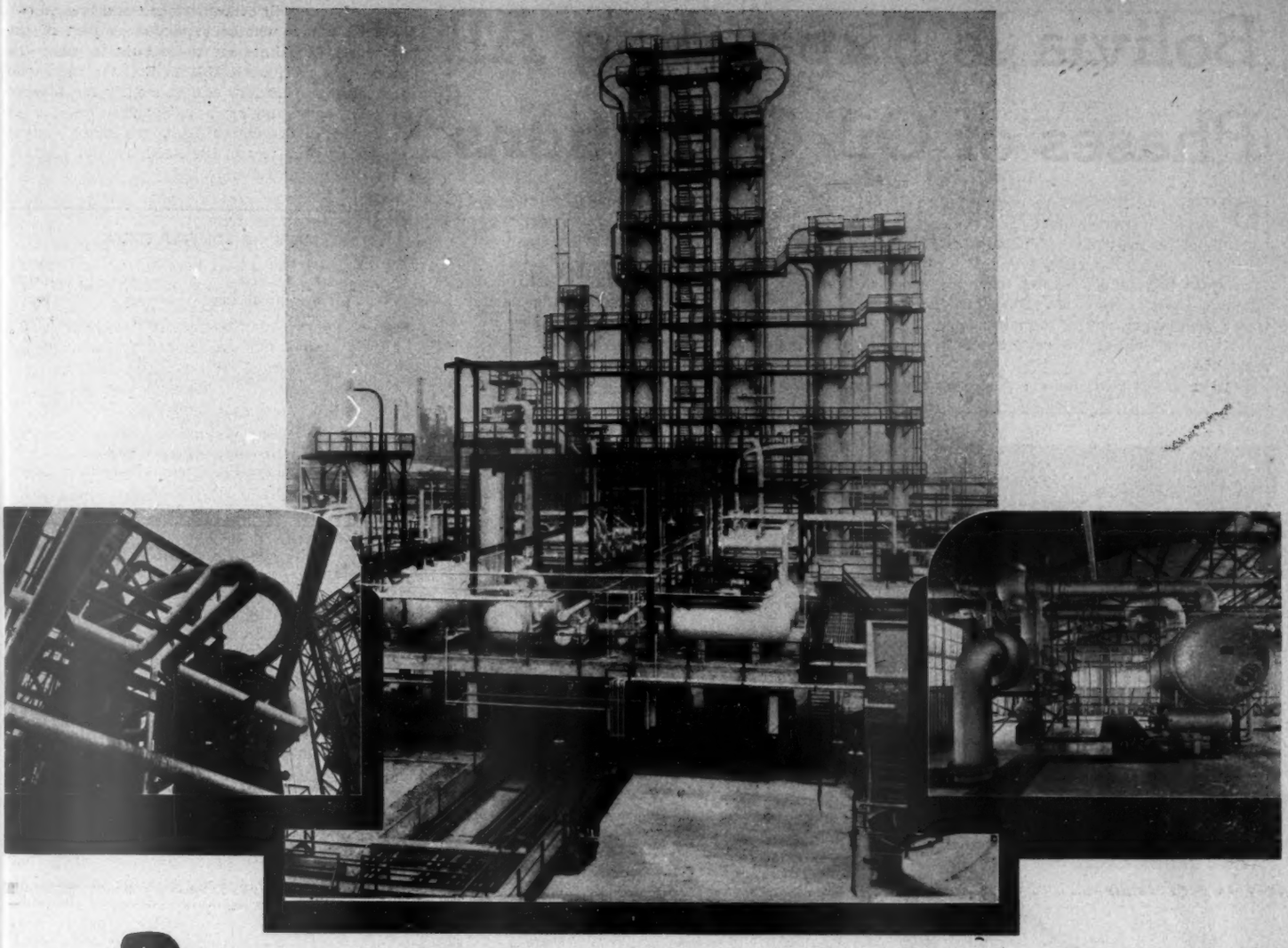

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Bolivia Is Expanding All Phases of Oil Operations

DEVELOPMENT and rehabilitation of Bolivia's four existing fields and exploration for additional reserves have been launched toward a goal of trebling production over the next 2 years. Currently Bolivia is credited with producing at the approximate rate of 1,900 bbl. daily with more than 50 per cent of the output derived from the Bermejo field on the southern Bolivia-Argentina border.

Earlier in the year, Bolivia was operating only nine producing wells in the Sanandita and Camiri fields. Seven of the active wells were in Sanandita and two in Camiri. Daily average production has been at the rate of 380 and 500 bbl., respectively, from the two fields. Bolivian Development Co. has been organized to prosecute the expanded development program. The Bolivian and United States governments are jointly represented in the development company which will use funds provided by American agencies. One new refinery will be constructed and one of two existing plants will be expanded as part of the program. Pipe lines are to be built to make the production more accessible in Bolivian industrial and mining operations and to modify the present necessity of shipping a substantial volume of crude oil to Argentina from the more distant producing countries in the northern and western parts of South America.

DATA ON BOLIVIAN FIELDS

Name—	Daily production	Proven acreage	Potentially productive acreage*
Camiri	500	640	5,000
Camatindi	Shut in	1,120	3,200
Sanandita	380	200	1,800
Bermejo	†1,000	2,560	11,500
Total	1,880	4,520	21.500

*Estimated on basis of geological evidence.

†Minimum committed deliveries to Argentina, effective February 1942.

Claims of the Standard Oil Co. of Bolivia whose oil properties were expropriated in 1936 were settled last April by a payment of $1,729,000 arranged through the Department of State.

Yacimientos Petroliferos Fiscales Bolivianos (the government oil agency), headed by Dr. Alberto Crespo Gutierrez, minister of national economy; Raul Zumelzu, president, and Arturo Machicao, general manager, has had active charge of Bolivian petroleum operations since expropriation of the private properties. Plans of Y.P.F.B. call for construction of a 2,000-bbl. refinery at Oruro, in the west central part of the country, for the manufacture of petroleum products required in mining operations.

The small topping plant at Camiri which has a capacity of 300 bbl. daily is to be increased to about 500 bbl. when equipment becomes available.

The Camiri field, most northern of the four within Bolivia, produces 53.1-gravity crude from the Devonian at about 3,200 ft. The field's two wells have proven an estimated total of 640 acres. Structural conditions indicate that the field may cover approximately 5,000 acres, although this conclusion is based entirely on meager geological evidence.

Current production of 380 bbl. daily is withdrawn from the Sanandita field. The most extensive development program is planned for Sanandita where the Bolivian Development Co. expects to raise output to around 1,800 bbl. daily during the next 12 months.

A local refinery at Sanandita has capacity of 345 bbl. daily and the crude requirements of this plant will be retained for processing. Excess production, or approximately 1,500 bbl. daily, will be moved through a pipe line to Positos, near Yacuiba on the Argentine railroad for transshipment by tank cars to Altiplano for refining and eventual distribution in the mining district surrounding that point.

The Camatindi field, midway between Camiri and Sanandita and in the same sub-Andian zone, has been idle since 1931 when Standard of Bolivi acompleted its third well.

Three pays exist in the Bermejo field, on the Bolivian-Argentine border, at 2,200 ft., 2,850 and at 3,600 ft. Under the agreement executed earlier this year between Y.P.F.B. and the Argentina oil agency, minimum deliveries of 1,000 bbl. daily of Bermejo crude are to be made to the southern republic. The crude will be moved through Standard Oil Co. of Argentina's pipe line from Aguas Blancas, across the river from Bermejo, to Embarcacion where it will be refined or transshipped by tank cars to other manufacturing facilities in Argentina.

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NOMADS RECOGNIZE THEIR RESPONSIBILITY TO THE INDUSTRY THEY REPRESENT

JAMES A. THOMAS

By JAMES A. THOMAS
Chairman, Nomads National Board of Regents

THE National Oil-Equipment Manufacturers and Delegates Society, known as the "NOMADS," was founded in 1938. Its purpose is to promote the spirit of cooperation and of good fellowship among its members and guests and to encourage those engaged in the distribution of oil-field equipment to foreign lands, at appropriate intervals and upon auspicious occasions, to lay down their labors and indulge in the society and companionship of their fellow members and those interested in the marts and commerce of the world.

With chapters in Los Angeles, Tulsa, Houston and New York, and by the nature of their work in supplying the oil fields of the world with equipment, the distribution of which requires world travel and contact with the nationals of every country where oil is produced, the Nomads are in a unique position to meet and greet all of the foreign oil legion who from time to time visit the United States. It is rare indeed that a chapter monthly meeting or other special function is held without having in attendance a guest from one or more of the far corners of the earth. From the pampas and southernmost coast of Patagonia up through the tropics to the Arctic oil fields of Canada, from Egypt and the Persian Gulf, from Russia, India and the Far East jungle fields of Borneo and Sumatra have come visitors who have been welcome and honored guests at our Nomad functions.

Fostered as purely a social organization, the Nomads soon recognized their responsibility to the industry which they represent. Many appropriate services heretofore handled by individuals are now carried out as an organization. Thus the Nomads have established for themselves a definite place in the oil industry which can very well develop further toward promoting and sustaining international good will.

Nothing at present, however, transcends in importance the prosecution of our war effort until the time when the United Nations shall be victorious, for without that victory international good will cannot exist as a vital force in the conduct of foreign commerce. No peacetime industry responded more quickly to our country's demand for conversion to manufacture of war materials than did the oil-field-equipment industry and, indeed, some of its peacetime products became essential war materials with few or no necessary changes. So also did the Nomads divert their efforts and activities toward the war effort, rendering multitudinous service to the War and Navy departments and to other branches of the government service. In that spirit we will carry on for the duration, confident in the knowledge that each of us has found the place where his abilities can best serve our country.

It is appropriate, as chairman of the board of regents, that I express what I know to be the sentiment of our entire membership at this time of the year. To all our friends the world over and particularly to them who are in the armed forces we send our heartiest season's greetings with the hope and anticipation that the New Year will bring to all success in their endeavor to carry on to that cherished goal for which we strive—"Peace On Earth, Good Will to Men."

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FRANK CHAMPION, Byron Jackson Co.
ROBERT CLARK, Specialty Oil Tools.
RALPH CLEMMONS, Petrolem Equipment Co.
GEO. S. COLLEY, in Philippines—whereabouts unknown.
R. R. CRUM, Crum-Brainard Co.
EARL M. DANIELS, Hydril Co.
PAUL P. DANIELS, Daniels Orifice Fitting.
E. L. DECKER, Martin-Decker Corp.
JOHN EASTMAN, Eastman Oil Well Survey Co.
R. J. EICHE, foreign equipment representative.
EARL F. ENGLISH, W. A. Bechtel Co.
AL FARROW, Mission Manufacturing Co.
E. B. FOWKS, Emsco Derrick & Equipment Co.
R. E. GIGNOUX, Hopper Machine Works, Inc.
JOHN GRANT, Grant Oil Tool Co.
ABE HAGLUND, Axelson Manufacturing Co.
L. S. HAMER, Hamer Oil Tool Co.
R. HENQUET, International Cementers.
ALLEN HICKS, Hydril Co.
ROY HITCHCOCK, U. S. Navy.
CLAY JOHNSON, Montebello Tool & Manufacturing Co.
M. O. JOHNSTON, M. O. Johnston Oil Field Service Corp.
T. M. JOHNSTON, M. O. Johnston Oil Field Service Corp.
DELBERT D. LEWIS, Drillers & Producers Ltd.
GEO. S. MacDONNELL.
RALPH W. MARSHALL, Drilling & Exploration Co.
TOM MARTIN, Eastman Oil Well Survey Co.
W. R. MARTIN, Martin-Decker Corp.
WILLIAM McGRAW, Western Pipe & Steel Co.
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HAROLD MEARS, Army Air Forces.
M. E. MONTROSE, Lane-Wells Co.
CUSTER A. MORROW, L. A. Shipbuilding & Drydock Corp.
HARRY C. MOOREHOUSE, Wagner-Morehouse.
G. WALDO MOORE, Cavins Co.
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L. J. PADDOCK, Stoody Co.
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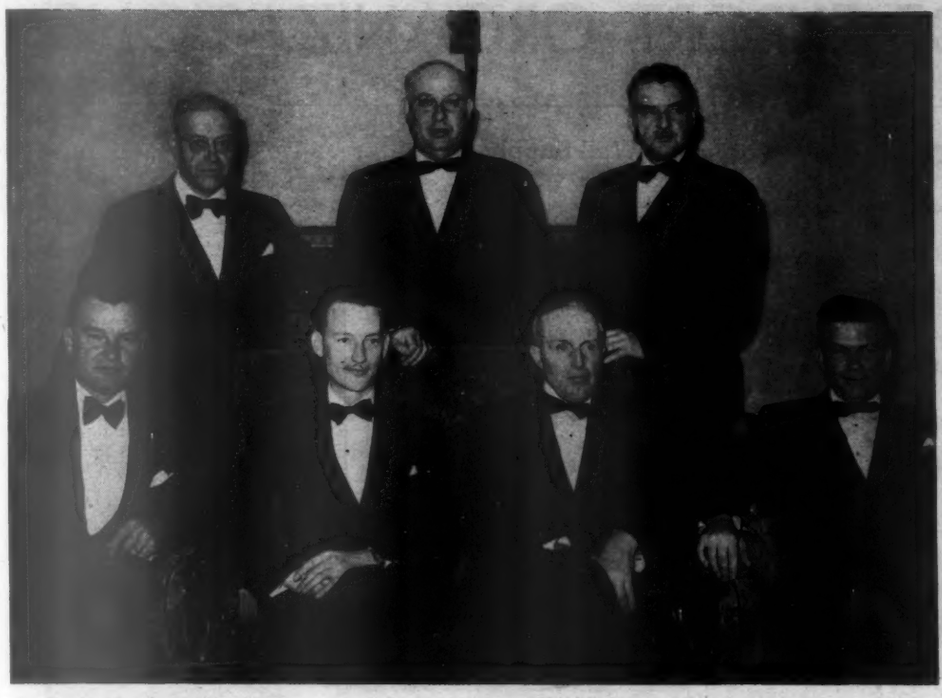
WALTER SEYMOUR, Non-Corrosive Products.
J. J. SIEGEL, Kobe, Inc.
E. M. SMITH, Globe Oil Tools Co.
E. MORRIS SMITH, Grizzly Manufacturing Co.



OFFICERS OF LOS ANGELES CHAPTER

Standing, left to right: J. C. Ballagh, assistant secretary; E. B. Fowks, member of board of regents; D. B. Waite, assistant treasurer. Seated, left to right: Roland Smith, sergeant-at-arms; W. F. Bettis, president; Earl M. Rees, vice president, and Elmer Smith, treasurer. Not shown in picture are T. Sutter, member of board of regents, and T. C. Murphy, deputy sergeant-at-arms

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R. BRONZAN, Baash-Ross Tool Co.
K. R. CATCHPOLE, D. & M. Machine Co.
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ROBERT CLARK.
RALPH CLEMONS.
LARRY COKER, National Supply Co.
NORMAN L. DORN, Lane-Wells Co.
BART V. GILLESPIE, U. S. Navy.
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W. C. (PETE) MAXFIELD, Merco Nordstrom Valve Co.
REED O'NEIL, Reed Roller Bit Co.
S. F. REMMEL, Byron Jackson Co.
HANS ROSS, Baash-Ross Tool Co.
J. B. SHAW, Grant Oil Tool Co.
MAC L. SMITH, Axelson Manufacturing Co.
KNIGHT TEMPLETON, Security Engineering Co.
HAROLD THEROLF, Eason & Therolf.
JACK A. WILCOX, S. R. Brown Co.

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R. E. HAVENSTRITE, California Western Oil Co.
WALTON H. HOAG, Western Geophysical Co.
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CHARLES H. TOLL, JR., Western Pipe & Steel.
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FRED TYLER, Reed Roller Bit Co.
D. B. WAITE, Pacific Pump Co.
CLARENCE WHITE, Oil Well Manufacturing Co.
WEBB W. WILSON, Webb Wilson Oil Tools.

OFFICERS OF THE TULSA CHAPTER

Seated, left to right: Fred E. Cooper, member of board of regents; C. O. Willson, president, and P. E. Fitzgerald, vice president. Standing, left to right: William B. Way, manager, International Petroleum Exposition; Shep Miers, chairman of the membership committee; H. M. Cosgrove, secretary-treasurer, and L. D. Baird, member of board of regents

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L. D. BAIRD, Baird Manufacturing Co.
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DON BOWERS, W. C. Norris, Inc.
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HAROLD C. PRICE, H. C. Price Co.
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(Subsidiary of the Continental Supply Co.)

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- D. & B. Pump & Supply Co.
- Emsco Derrick & Equipment Co.
- Farrar & Trefts, Inc.
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- Lucey Products Corp.
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- Technical Oil Tool Corp., Ltd.
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- Cameron Iron Works, Inc.
- Chain Belt Co.
- Equipment Engineers, Inc.
- Fluid Packed Pump Co.
- Hughes Tool Co.
- Maloney Tank Mfg. Co.
- Reed Roller Bit Co.
- South Chester Tube Co.
- Web Wilson Oil Tools

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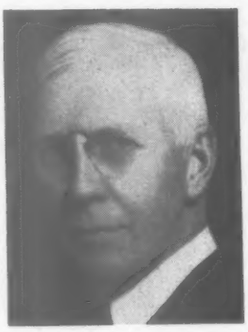
The National Supply Corp.

30 Rockefeller Plaza, New York, N. Y.
River Plate House, London.

L. V. BOGGS



F. T. OSTRANDER

E. M. GRETZLER

L. V. Boggs, vice president.
F. T. Ostrander, vice president.
E. M. Gretzler, manager export sales.
Representatives, Port of Spain, Trinidad; Buenos Aires, Argentina; Sydney, Australia; Rio de Janeiro, Brazil; Maracaibo, Venezuela.
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- Roebling Wire Ropes
- Novo Pumps and Engines
- Skinner Pipe Clamps
- National Tanks & Separators
- Broderick Boilers
- Dunlap Drag Bits
- Stoody Hard-Facing Metals
- Manhattan Rubber Products
- Billings & Spencer Tongs
- Superior Diesel & Gas Engines
- National-Ideal Drilling and Production Equipment
- Spang Chalfant Tubular Products
- Bestolife Thread Lubricants
- Corwin-Vernon Desanders
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Oil Well Supply Co.

(Subsidiary of United States Steel Corporation)
Export division: 30 Rockefeller Plaza, New York, N. Y. Room 3023—R.C.A. Building, M. E. Nicklin, export manager. M. E. Keenan, assistant to export manager.

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Manufacturers of complete oil well drilling equipment powered by steam or internal combustion engines; and complete surface and subsurface equipment for production requirements.
Suppliers:
- Tiger brand products of American Steel & Wire Co.
- Drill pipe, line pipe, casing and tubing manufactured by National Tube Co.

Exclusive distributors:
- Kerotest Manufacturing Co. products.

Export offices in:
- England—London, Dashwood House, 69 Old Broad St., Ashley Carter, manager; Cecil T. Longcroft, sales manager.
- Argentina—Buenos Aires; Paseo Colon 285; R. F. Frascogna, representative.
- Cuba—Havana; Woodward, McMillan y Cia., Edificio Met., 740.
- Brazil — Rio de Janeiro; Geohydro, Ltda., Caixa Postal 1409.
- Trinidad—San Fernando; W. S. Robertson & Co., Ltd.
- Union of South Africa—Johannesburg; Denver Machinery Co., Ltd., 206 Commissioner St.
- Venezuela—Maracaibo; Apartado 211, Clifford T. Dolaway, representative.

EXPORT REPRESENTATIVES

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- Ang-Lite Co.
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- The Brewster Co.
- Brown Oil Tool Co.
- Franks Machine Co.
- Mills Alloys, Inc.
- Northrup Equipment Co.
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•

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Armco International Corp., Havana, Cuba; Armco International Corp., San Juan, Puerto Rico; Armco Mexicana, S. A., Mexico City, D. F.; C.A. Armco Venezolana, Caracas, Barcelona and Maracaibo, Venezuela; Armco Colombiana, S. A., Barranquilla, Colombia; Armco International Corp., Rio de Janeiro, Brazil; Armco Industrial e Comercial, S.A., Sao Paulo, Brazil; Armco Industrial e Comercial, S.A., Buenos Aires, Argentina.

•

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A. A. DILL

A. A. Dill, manager, New York division.
50 Church St. (Room 1850) New York,N.Y.
- Axelson Mfg. Co., Inc.
- Jensen Bros. Manufacturing Co.

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J. H. BAIRD

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Texas Rubber & Specialty Corp.
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Byron Jackson Co. (Oil Tools Division)

O. W. MORGAN, JR.

O. W. Morgan, Jr., export sales manager.
420 Lexington Avenue, New York, N. Y.

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Cardwell Manufacturing Co., Inc.

F. J. OLSON

F. J. Olson, export manager.
570 Lexington Ave., New York, N. Y.

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Edward L. Carter

30 Rockefeller Plaza, New York, N. Y.

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W. C. Norris Mfg. Corp.
Shaffer Tool Works
Tom Wheatley Co.
Wheatley Bros. Pump & Valve Mfrs.

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George B. Flanigan, district manager.
220 E. Forty-second St., New York, N. Y.

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HERB E. MALAND

Herb E. Maland
50 Church St., New York, N. Y.
Hamer Oil Tool Co.

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Crawford Engineering Co., Inc.

H. D. Crawford, president.
295 Madison Ave., New York, N. Y.
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McCord Radiator (Lubricator Division)
Meriam Co.

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Guy E. Daniels

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GUY E. DANIELS

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R. J. EICHE

Manhattan Beach, Calif.
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Chiksan Tool Co.
Crum-Brainard Co., Ltd.
Eason-Theroif Tool Co.
Eastman Oil Well Survey Corp.
Hamer Oil Tool Co.
Hopper Machine Works, Inc.
Specialty Oil Tool Co.
Web Wilson Oil Tools
Well Equipment Mfg. Co.

•

Lloyd G. Ensign

30 Rockefeller Plaza, New York, N. Y.

LLOYD G. ENSIGN

South American Representative:
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Port-of-Spain, Trinidad.
Broderick & Bascom Rope Co. (Trinidad)
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Poist Tool Co.
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Cameron Iron Works, Inc.
Gearench Manufacturing Co.
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7 Hanover Square, New York, N. Y.
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American Blower Co.
Bucyrus-Erie Co.
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P. J. Lea
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South American offices:
J. W. Des Champs
Calle Defensa 320
Buenos Aires, Argentina.
S. R. Chambless
P. O. Box 117, Port-of-Spain, Trinidad.

•

International Derrick & Equipment Division of International Stacey Corp.

A. L. (Tony) WORACEK

A. L. Woracek, export sales manager.
21 West St., New York, N. Y.

•

Industrial Agencies, Ltd.

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San Fernando
Trinidad, B. W. I.
M. J. Thompson, managing director.
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Buda Co.
Cavins Co.
Chiksan Tool Co.
Crum-Brainard Co.
De-oXo-Lin Chemical Products, Inc.
Eastman Oil Well Survey Corp.
Jensen Brothers Manufacturing Co.
Jeffrey Manufacturing Co.

Mineral Products Corp.
Oil Well Manufacturing Corp.
Well Equipment Corp.
Web Wilson Oil Tools
Wilson Manufacturing Co.

•

International General Electric Co.

570 Lexington Avenue, New York, N. Y.
George H. Magner
C. R. Tunell
E. H. Sheahan

•

C. C. McDermond

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•

National Transit Pump & Machine Co.

Charles A. Swartz
30 Rockefeller Plaza, New York, N. Y.

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Oilfield Equipment Co.

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Thomas E. Ward, president.
30 Church St., New York, N. Y.

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Jose Sanchez
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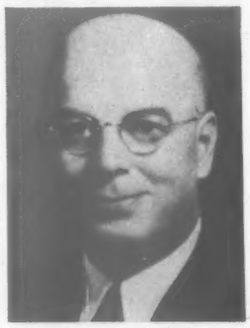
Pennington Signaling Core Barrel
R. F. Electrical Mfg. Co.
Standco Brake Lining Co.
Standco Bolt Co.
Trumble Oil & Gas Separators

Parkersburg Rig & Reel Co.



JAMES A. THOMAS

James A. Thomas, export manager.
19 Rector Street, New York, N. Y.
Baker Oil Tools Co., Inc.
Parkersburg Rig & Reel Co.

•

Petroleum Machinery Corp.

W. J. CAMPBELL

W. J. Campbell, president.
30 Rockefeller Plaza, New York, N. Y.

San Fernando, Trinidad, B.W.I.
P. O. Box 52
Buenos Aires, Argentina
Reconquista 165
Caracas, Venezuela
Sur 25—Los Caobos
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American Well & Prospecting Co.
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Service Caster & Truck Co.
Triad Products Co., Inc.
Turbolite, Inc.
West American Rubber Co.

•

John A. Roebling's Sons Co.

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W. P. Laseter, manager export division.
19 Rector Street, New York, N. Y.

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Reed Roller Bit Co.

H. B. BOOK

H. B. Book, export manager.
30 Rockefeller Plaza, New York, N. Y.
Buenos Aires, Argentina, Avda. Pte. R. Saenz Pena 832.

•

Shand & Jurs Co.

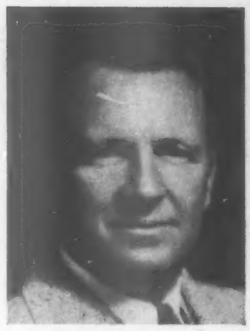
Ralph F. Ley, eastern div. mgr.
295 Madison Avenue, New York, N. Y.

•

A. V. Simonson

149 Broadway, New York, N. Y.

The Buda Company
Franks Mfg. Corp.
Gaso Pump & Burner Mfg. Co.
Hinderliter Tool Co.
Lufkin Foundry & Machine Co.
McKissick Products Corp.



A. V. SIMONSON

•

Westinghouse Electric International Co.

RUSSELL D. HEATH

Russell D. Heath, manager oil and mining export sales.
40 Wall Street, New York, N. Y.

•

Wickwire Spencer Steel Co.

WILLIAM H. LYNN

William H. Lynn, export sales manager.
500 Fifth Avenue, New York, N. Y.

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Val R. Wittich

30 Rockefeller Plaza, New York, N. Y.

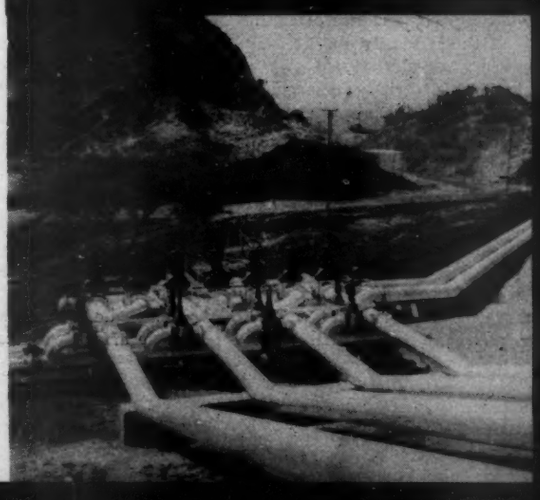
VAL R. WITTICH, JR.

J. M. Fernandez
(Continued on Page 245)

Bilingual presentation of newest techniques in drilling, production, transportation and refinery engineering, along with the newest practices in exploration and in the manufacture of natural gasoline.

★ ★ ★

Sección bilingue, en la cual se describen las procedimientos y técnica más moderna en lo tocante a perforación, producción, exploración, transporte y refinería y la manufactura de gasolina natural.



Instrumentation and automatic recording devices have been applied to an increasing number of factors in drilling operations, removing the human element as far as possible

Los instrumentos y dispositivos registradores automáticos se están aplicando a un creciente número de factores en los trabajos de perforación, para reducir lo más que se pueda, el elemento humano

Progress in Drilling

Introduction

THE drilling industry throughout the world was affected immeasurably during the past year by conditions beyond the control of the oil industry. As much of the machinery and equipment used in drilling the wells in the United States, South America and all over the world is composed essentially of high-grade steels and other strategic materials, the effect of the war effort was enormous.

The manufacture of a gun barrel is essentially the same as that for a drill collar, even including the composition of the steel. Similar parallels exist between much of the drilling equipment and the necessary war items.

The diversion of personnel normally employed to develop new and improved drilling equipment in the war effort also took its toll. Thus many of the improvements in the process of development had to be abandoned. Fortunately others were far enough along that they were brought to fruition and put to use.

A major problem, brought to the fore by the year's developments, was that of maintenance as it became apparent that the drilling industry would have to do business for possibly the next several years with the equipment it now has on hand. Formerly the greatest stress was laid on efficiency and the drilling and completion of wells with the expenditure of the minimum of time and money. At present, less stress is being laid on hole making than on getting the maximum service from the equipment. The tendency is to shut down and repair any item before a major difficulty arises.

The strategic importance of equipment and the necessity for keeping it operating has already led to the introduction of strictly emergency measures. Some of the things done with drill pipe and tool joints during the past year would not have been attempted except for the existing necessity. In many cases emergency measures brought on by the war will undoubtedly lead to major advances.

In so far as possible during the year there has been an extension of practices already introduced. Maxi-

Progreso en Perforacion

Introduccion

LA industria de la perforación, en todas partes del mundo, fué desmesuradamente afectade durante el año pasado, por condiciones afuera del gobierno de la del petróleo. Como gran parte de la maquinaria y equipo que se usa para la perforación de pozos en los Estados Unidos de América, América del Sur y demás partes del mundo, se hace principalmente de aceros de superior calidad y de otros materiales estratégicos, el efecto de la guerra ha sido verdaderamente enorme.

La frabricación de un cañón de artillería es esencialmente igual a la de un collar para sonda, incluyendo hasta la composición del acero. Similares paralelos existen entre muchos elementos de equipo y necesarios artículos de guerra.

La dedicación a los fines de la guerra de gran parte del personal ocupado normalmente en desarrollar y perfeccionar equipo de perforación ha producido también efectos sensibles en la industria. Por esta razón, muchos de los refinamientos en via de desarrollo, se han abandonado. Por suerte, otros estaban bastante adelantados ya, y pudieron ponerse en práctica oportunamente.

Un problem importante, surgido de los acontecimientos del año, fué el de la conservación, pues se presentó evidente el hecho de que la industria de la perforación tendrá que avenirse, probablemente por varios años, con el equipo que tiene a su inmediata disposición al presente. En años pasados, el mayor énfasis se daba al rendimiento, perforación y terminación de los pozos, sobre la base de una inversión mínima de tiempo y capital. Al presente, se da menos énfasis a la perforación del pozo que a la obtención del servicio máximo del equipo. La tendencia es hacia suspender el trabajo y reparar el equipo antes de que se presente una dificultad importante.

La importancia estratégica del equipo y la necesidad de mantenerlo ocupado han tenido ya por resultado la introducción de estrictas medidas de emergencia. Algunas de las cosas hechas con tubos de perforación y uniones para herramientas, durante el año pasado, no se habrian atentado, si no hubiera sido por existente

mum efficiency, increased portability and greater flexibility of operation have been sought. The tendency to use masts in place of derricks has also increased. The design of rigs and the remodeling of rigs to obtain greater efficiency are attracting the attention of the drilling engineer. All signs at present point to rigs after the war which will be models of efficiency and effectiveness. Supercharging and vapor phase cooling of engines, air controls on clutches, streamlined fluid systems and high rotation speeds can be expected.

Importance of Filter Cake and Water Loss in Drilling Fluids

The increasing realization by the operators of drilling equipment of the importance of water loss and filter cake characteristics of the drilling fluid has played an important role in drilling progress. Formerly stress was laid on the viscosity, density, gel strength and pH of the mud. Now all the stress is laid on the filter cake and the water loss of the mud.

These two characteristics are the direct measurement of the results which are responsible for the trouble. The items formerly stressed were merely some of the physical properties of a drilling fluid which might or might not produce the desired result. The water lost from the mud causes a wetting and a consequent sloughing of the incompetent formations; the filter cake deposited on the walls of the bore hole, if too thick, often causes tight holes and the sticking of drill stems. By preventing the wetting of the formations and the deposition of a dangerously thick filter cake, most of the troubles encountered in a bore hole can be prevented.

The other source of difficulty which comes from poor drilling fluid is the failure of the fluid to suspend the cuttings when circulation is interrupted while making a connection or a trip out of and into the hole. This suspending of the drill cuttings is dependent on the viscosity and the gel strength of the drilling fluid. Generally, the viscosity and gel strength will be within a reasonably safe range if the water loss and filter characteristics are properly maintained. A water loss of 15 cc. and a filter cake of 1/32-in. will give satisfactory results unless the drilling is being done in a dangerous territory.

For the control of the water loss and filter-cake characteristics, the only instrument necessary is a filter press which was introduced several years ago. It is familiar to all drilling engineers. The unusual thing noted during the past year is the widespread application of this instrument. It is becoming as standard equipment on the drilling rig as the weight indicator and mud-pump pressure gage.

Importance of Drilling Bore Holes to Gage

One of the principal advances in drilling concepts during the past year was the increasing importance placed on the necessity of drilling the bore holes to gage.

It has become increasingly evident over the past few years that many of the major troubles of drilling and production operations have been due to this factor. For instance, investigation in one case of a deep well, which was bothered extensive-

necesidad. En muchos casos, las medidas de emergencia surgidas de la guerra, conducirán, sin duda alguna, a progresos importantes.

Durante el año pasado ha habido, en todo lo posible, una extensión de las prácticas ya introducidas. Se hizo esfuerzo por acentuar el rendimiento máximo, la portabilidad y la adaptación del equipo al trabajo. Aumentó también la tendencia al uso del mástil, en lugar de la torre. El tipo de aparajo de perforación y la reforma de los aparejos, para lograr un mayor rendimiento, están atrayendo la atención del ingeniero de perforación. Todas las indicaciones, al presente, dan a entender que los aparejos de perforación, después de la guerra, van a ser modelos de rendimiento y efectividad en máximo grado. Podemos también adelantar refinamientos en sobrecompresión y enfriamiento de fase de vapor en los motores, gobiernos neumáticos para los embragues, sistemas hidráulicos simplificados y grandes velocidades.

Importancia de la costra filtrante y pérdida de agua en los flúidos de perforación

El creciente entendimiento, por parte de los operarios de equipo de perforación, de la importancia de la perdida de agua y características de la costra filtrante del flúido de perforación, ha tenido mucha influencia en el progreso de la perforación. Anteriormente se daba énfasis a la viscosidad, densidad, resistencia de la substancia gelatinosa y el factor pH del lodo. Actualmente, todo el énfasis se concentra en la costra filtrante y la pérdida de agua del lodo.

Estas des características son la medida directa de los resultados provocativos de la falta. Los aspectos que anteriormente se acentuaban eran sencillamente algunas de las propiedades físicas del flúido de perforación, que podian o no producir el resultado apetecido. La pérdida de agua del lodo causa una mojadura y una consiguiente encostradura de las formaciones incompetentes; la costra filtrante depositada en la pared del agujero perforado, al ser demasiado espesa, a menudo aprieta los agujeros y causa la inmovilización de los vástagos de sonda. Evitando la mojadura de las formaciones y la acumulación de una costra filtrante peligrosamente gruesa, se suprimen casi todas las dificultades que se presentan en el agujero perforado.

Otra fuente de dificultades, resultante del flúido de perforación de mala calidad, es la falla del flúido en suspender los despojos, cuando se interrumpe la circulación, para hacer una conexión o para subir o bajar las herramientas por el agujero. La suspensión de los despojos de perforación depende de la viscosidad y resistencia de la substancia gelatinosa, del flúido de perforación. Por lo general, la viscosidad y la resistencia de la substancia gelatinosa quedarán dentro de un límite racional si las características de pérdida de agua y del filtro se mantienen en debida forma. Una pérdida de agua de 15 cc. y una costra filtrante de 1/32" darán resultados satisfactorios, a menos que la perforación se esté haciendo en un punto peligroso.

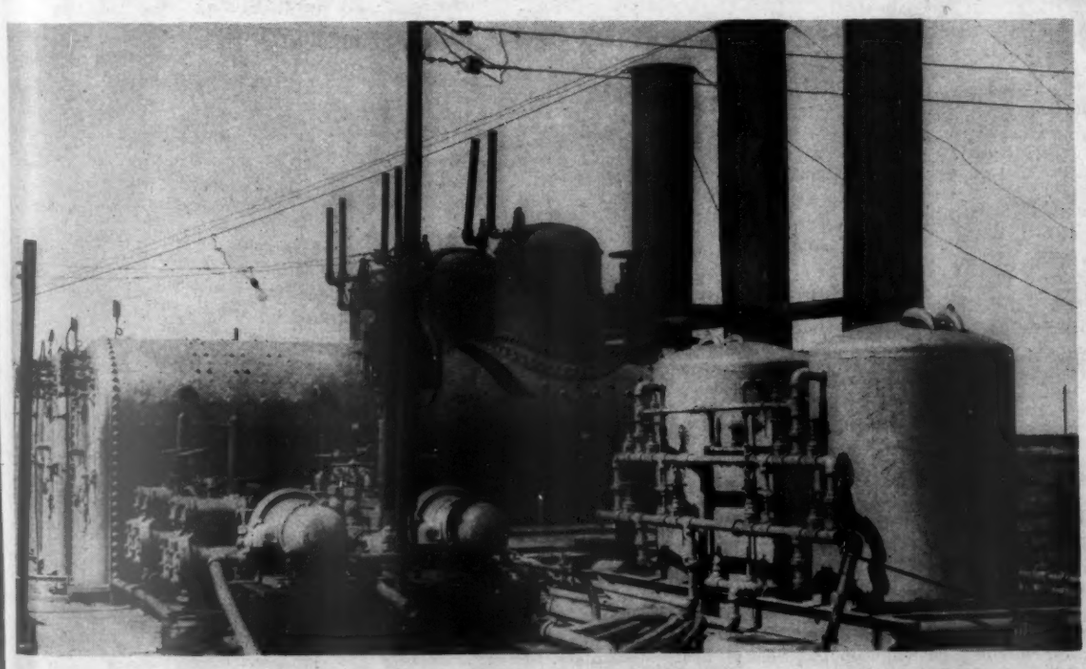
Para el gobierno de las características de pérdida de agua y costra filtrante, el único instrumento que se necesita es un filtroprensa, introducido hace varios años. Es conocido entre todos los ingenieros de perforación. La cosa más extraordinaria observada el año pasado fué el uso creciente de este instrumento. Se está haciendo tan necesario, como equipo normal del aparejo de perforar, como el indicador de peso y el manómetro de la bomba de lodo.

Importancia de la perforación de pozo a diámetro uniforme

Uno de los principales progresos alcanzados en el conocimiento de la perforación, el año pasado, fue la importancia creciente que se está dando a la necesidad de perforar los pozos a un diámetro uniforme.

Durante estos últimos años se ha visto, con creciente convicción, que muchas de las principales faltas en los trabajos de perforación y producción, se han debido a este factor. Por ejemplo, la investigación, en un casa típico, de un pozo profundo, que dió mucho que hacer por torceduras a 2.000 y 2.700 pies, mostró que los derrumbes del agujero, en este intervalo, estaban permitiendo que la tubería de perforación asumiera un movimiento excéntrico y trepidante. El acondicionamiento del lodo, para evitar la erosión y disolver los esquistos en esta sección, suprimió las torceduras.

Los inconvenientes resultantes de la falla de la tubería de producción,



Longer service for available equipment is the chief goal of all operating men, accounting for water-treating installations such as this designed to remove minerals before water is injected into boilers

La mayor duración para el equipo existente es la obligación más importante de los ingenieros, y esto explica las instalaciones de tratamiento de agua, como la presente, que quitan todo mineral del agua, antes de su inyección en las calderas

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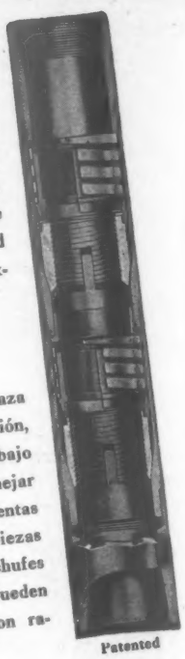
AMERICAN RELEASING AND CIRCULATING OVERSHOT

With this Double Bowl Overshot on your derrick floor you are prepared for any unexpected fishing job. It is capable of handling either tool joint or drill pipe without changing the packer rubbers and slips. Single Bowl American Overshots can be converted into Double Bowl type, quickly and inexpensively.



Patented

Con este enchufe "Overshot" de doble taza en el piso de su aparejo de perforación, queda Vd. preparado para cualquier trabajo de salvamento o pesca. Puede manejar uniones de espiga y cajas para herramientas o tubo de perforación, sin cambiar las piezas de caucho del tapón y cuñas. Los enchufes "Overshot" American de una taza pueden convertirse en tipo de doble taza con rapidez, facilidad y economía.

AMERICAN SIMPLOMATIC CATHEAD

Specially designed for high speed power drawworks. Practically all shocks and jars have been eliminated by lightening the engaging member to which the jerk line is attached. Light, compact, simple. Only 7 parts.

Especialmente proyectado para tornos de extracción de fuerza mecánica de alta velocidad. Casi todos los choques y sacudidas se han suprimido por el menor peso del miembro de enganche al cual va unido el cable. Liviano, compacto y sencillo. Este cabrestante tiene sólo 7 piezas.

Pat. Pend.

AMERICAN SUCKER ROD COUPLING AND PARAFFIN SCRAPER

A three-in-one tool that can be used as a paraffin scraper, sucker rod guide, and for barrel alignment. Made of one-piece, heat treated, forged steel to resist hardest usage. (Patented).

Una herramienta "tres en una" que puede usarse con raspador de parafina guía de varilla de bomba y para alineación de cilindro o cañón. Se hace enterizo de acero forjado, tratado al calor, de gran resistencia al uso más severo.

AMERICAN RELEASING AND CIRCULATING SPEAR

Used successfully everywhere for fishing for liners, casing, drill pipe and tubing. Ruggedly constructed, simple in design. Has quick, positive releasing feature. (Patented).

Se usa con éxito en todas partes para salvamento de forros, revestimiento, tubo de perforar y tubería. De firme construcción y sencillo en construcción. Tiene rasgo de soltura rápido y positivo.

AMERICAN CONTROL HEAD "TYPE A" PACKER

This packer will hold its seal under extreme pressures. Has more fluid by-pass area than any other packer. Control head feature has positive seal—no valves to leak. Small valves in bottom of packer help flow your well.

Este tapón mantiene su cierre bajo presiones extremas. Tiene más superficie de paso de flúido que todo otro tapón. El rasgo de cabeza de control tiene cierre positivo—sin válvula sujeta a escape. Las válvulas pequeñas al fondo del tapón ayudan la acción del pozo.

Pat. Pend.

AMERICAN STANDPIPE AND MANIFOLD FITTINGS

These high pressure fittings are made from best grade of alloy steel castings. Designed to reduce frictional losses on manifold and lines. Tested to 6,000 lbs.

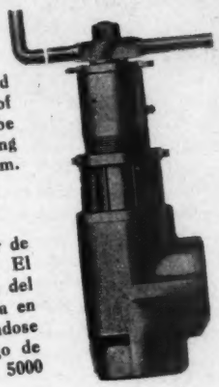
Estas conexiones de superior calidad se hacen de excelentes aleaciones de acero. Sirven para reducir las pérdidas por fricción o rozamiento en los tubos ramificados y tubería. Ensayadas a 6000 libras.

D MACHINE WORKS COMPANY PRODUCTS

AMERICAN MANIFOLD VALVE

Here is an outstanding pump manifold valve. Locking feature on the top of the stem housing permits valve to be set at any position desired, thus doing away with creeping of the valve stem. Will withstand 5,000 lbs. pressure.

Esta es una válvula de distribuidor de bomba de sobresaliente calidad. El rasgo de cierre encima de la caja del vástago permite colocar la válvula en cualquier posición deseada, evitándose así el desplazamiento del vástago de la válvula. Puede resistir hasta 5000 libras de presión.



Pat. Pend.

AMERICAN ROCKER ARM

Helps pump run more smoothly and efficiently. Eliminates knocking and needless noise. Working parts enclosed to keep out dirt and slush. Easily installed.

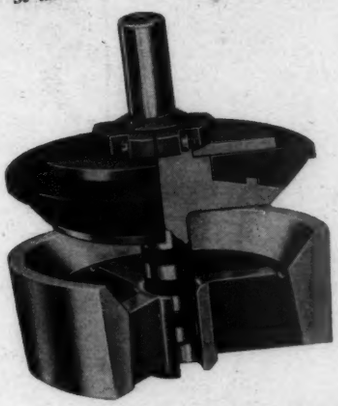
Ayuda a la bomba a funcionar con mayor suavidad y eficacia. Elimina el golpeteo y ruido innecesario. Las piezas móviles están protegida para que no tengan contacto con el polvo y lodo. Se instala con facilidad.

Patented

AMERICAN SLUSH PUMP VALVE AND SEAT

Built to withstand the pounding of modern power pumps. Has quick-change ring for holding insert and insert plate. Heavy-type rubber inserts that resist high pressure. Composition rings on valve stem reduce wear.

Construdio para resistir el golpe de las modernas bombas mecánicas. Tiene anillo de rápido cambio para sujetar la inserción y su placa. Inserciones de caucho de trabajo pesado, resistentes a la alta presión. Los anillos de composición en el vástago de la válvula reducen el desgaste.

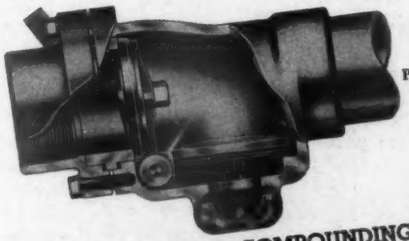


AMERICAN RELEASE VALVE

Enjoys world-wide popularity because it has reduced the difficulties usually encountered with most stop cocks or release valves used on slush pumps. Simple in construction, fool-proof, rugged. Tested to 3,000 lbs.

Esta válvula de escape goza de popularidad universal, a causa de que ha reducio las dificultades que generalmente se presentan con casi todos los grifos de cierre o válvulas de escape que se usan en las bombas de lodo. Sencilla en construcción, a prueba de manos inexpertas y muy durable. Ensayada a 3000 libras.

Patented



Patent Pending

AMERICAN SLUSH PUMP COMPOUNDING VALVE

Greatly speeds up the compounding of slush pumps, yet is so simple in design and operation it will last almost a life-time. The seat and valve can be changed with valve on pumps the same as on our American Release Valve. Tested to 5,000 lbs.

Grandemente acelera la acción de las bombas de lodo y es tan sencilla en construcción y funcionamiento que puede durar indefinidamente. El asiento y la válvula pueden cambiarse con la válvula en las bombas, lo mismo que en nuestra válvula de escape American. Ensayada a 5000 libras.

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ly by twistoffs at 2,000-2,700 ft., showed that washouts of the hole in this interval were allowing the drill pipe to assume an eccentric and whipping motion. Mud conditioning to prevent erosion and dissolving of the shale in this section eliminated twistoffs.

Troubles with casing failures have on numerous occasions been due to this cause. This is principally due to the fact that when the cement was placed back in the pipe the presence of a cavity allowed the cement to channel. It has also been found that there was sufficient cavitation of the formations to affect greatly the height of the cement behind the pipe.

If the program calls for the drilling of an 8¾-in. hole and this gage is kept throughout, it is believed that both the drilling and production of the well will be greatly simplified.

Triplex Steam Pumps

The introduction of triplex steam pumps for handling drilling fluid was one step to eliminate troubles from insufficient fluid capacity in drilling wells.

The new triplex pump is an 18 by 7 by 20-in. size, but its over-all length is less than a duplex pump having a 20-in. stroke. Each cylinder is a separate steel casting and is interchangeable with the other cylinders. A newly designed valve mechanism has cut down the lag to where the action is almost instantaneous. Pistons operate on a very short cushion.

While these pumps were put into use primarily to eliminate hole difficulties, it has been found the greater fluid capacity has been effective in reducing the number of bits required. These pumps are designed for use in deep drilling and to date they have been used on wells from 8,000 to 12,000 ft. in depth.

Organic Treatment for Drilling Fluid

The greatest advance in the handling of drilling fluid, and one of major importance as far as drilling in general is concerned, has been the development during the past year of a satisfactory treatment for the reduction of the water loss and filter cake in salt-water contaminated fluids. The main ingredient required is an organic colloidal material.

The material (Impermex) is a special organic colloid which is added to the drilling fluid containing salt. The salts (calcium, magnesium, sodium) in the fluid are a partial preservative, but it is necessary to add other chemicals to prevent growth of organisms which will cause the mud to lose some of its desirable properties.

The application of this material, se han debido, en numerosas ocasiones, a esta misma causa. Esto se debe principalmente al hecho de que cuando se puso el cemento detrás del tubo, la presencia de una cavidad permitió que el cemento se acanalara. Se ha visto también que había suficiente hueco en las formaciones para afectar grandemente la altura del cemento detrás del tubo.

Si el programa indica la perforación de un agujero de 8¾" y si este diámetro interior se mantiene en toda la extensión, se cree que tanto la perforación como la producción del pozo se simplificarán grandemente.

Bombas tríplices de vapor

La introducción de las bombas tríplices de vapor, para el manejo del flúido de perforación, fué un paso encaminado a suprimir las faltas provenientes de insuficiente capacidad de flúido en la perforación de pozos.

La neuva bomba tríplice es un modelo de 18 por 7 por 20 pulgadas, pero su longitud total es menor que la de la duple con carrera de 20 pulgadas. Cada cilindro de acero fundido es independiente e intercambiable con los compañeros. Un mecanismo de válvula de nueva construcción ha reducido la retardación de movimiento hasta el punto en que la acción es casi instantánea. Los émbolos funcionan con una carrera muy corta.

Estas bombas han sido instaladas principalmente para suprimir las dificultades en los agujeros, pero se ha visto también que su mayor capacidad de flúido ha sido efectiva en reducir el número de barrenas requerido. Estas bombas se hacen para uso en perforación profunda, y hasta ahora han servido muy bien en pozos de 8.000 a 12.000 pies de profundidad.

Tratamiento orgánico del flúido de perforación

El mayor progreso en el manejo del flúido de perforación, y uno de fundamental importancia en lo tocante a la perforación en general, fué el desarrollo, durante el año pasado, de un tratamiento satisfactorio para la reducción de la pérdida de agua y costra filtrante en los flúidos o líquidos contaminados con agua salada. El ingrediente principal que se requiere es un material orgánico coloidal.

El material (Impermex) es un coloide orgánico especial, que se agrega al flúido de perforación, que contiene sal. Las sales (calcio, magnesio, sodio) en el flúido son un preservativo parcial, pero es necesario añadir otras substancias químicas para impedir el crecimiento de organismos que pueda causar que el lodo pierda algunas de sus propiedades apetecidas.

La aplicación de este material y los resultados que se obtienen de él, han sido conocidos desde hace años, pero había un buen número de detalles relacionados con su uso, que no se conocía a fondo. Uno de ellos era la fermentación del flúido de perforación. El material de almidón hidrolizado se agregaba al flúido y se obtenian los resultados deseados; pero. pocos días después, aumentaba de neuvo la pérdido de agua y se empeoraba gradualmente el líquido de perforación. Se descubrió entonces que la acción bacterial causaba fermentación, algo que antes no se experimentaba cuando se usaban flúidos inorgánicos para la perforación.

Ahora que la fermentación puede evitarse con la adición de substancias químicas preservativas recientemente perfeccionadas, es posible tomar un flúido de perforación de agua salada, con una pérdida de agua de 150 cc., tratarlo con la substancia orgánica y reducir la pérdida a sólo 10 o 12 cc. Podrá reducirse más todavía, si se quiere. De 2 a 5 libras del material comercial, por barril de flúido de perforación, es la cantidad usada. El precio del material es relativamente bajo, en vista de los resultados obtenidos

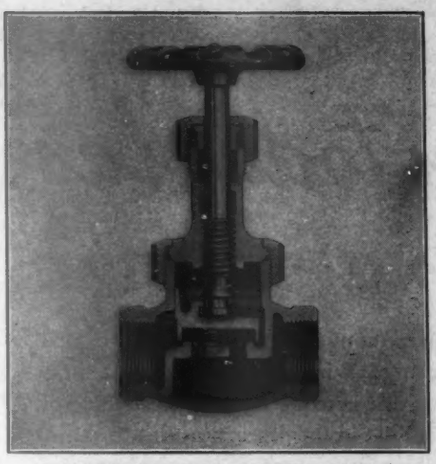
No se requiere una gran cantidad de sal para afectar al líquido de perforación hasta el punto en que no puede ser tratado satisfactoriamente por los métodos ordinarios que se emplean para los flúidos preparados con agua dulce. Una cantidad tan baja como 0,5 por ciento (5.000 p.p.m. de sal) en el líquido de perforación, causará sensible inconveniente. El flúido de perforación, que contiene 2 o 3 por ciento de sal, es el más difícil de tratar, porque, además de tener las características de lodo de agua dulce, hay en él presente cierta cantidad de electrolito, que conduce a una especie de coagulación de las partículas, seguida por una gran pérdida de agua. La dilución del flúido de perforar y la adición de 3 a 5 libras del material coloidal orgánico reducen la pérdida de agua a 10 o 12 cc. y la costra filtrante a 1/32 o 2/32 de pulgada.

La potencialidad del material coloidal orgánico no ha sido todavía comprendida en toda su extensión. Con el tiempo se verá que es tan importante como el descubrimiento del efecto de la bentonita en el líquido de perforación.

La perforación satisfactoria de un pozo a través de esquisto "palpitante" de 8.750 a 13.728 pies, con un

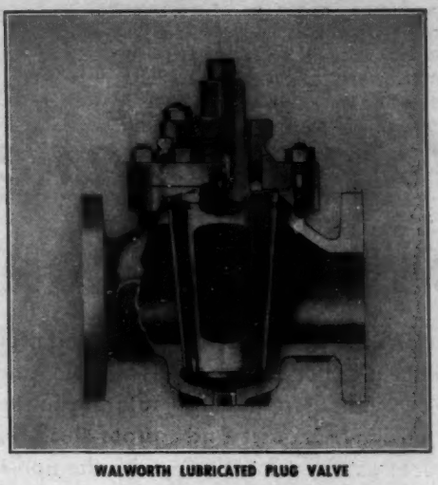
Portable rotary rigs, requiring less tonnage of critical materials and less manpower for rigging up and moving, are extensively used in shallow and medium drilling operations

Los aparejos de perforación rotativa, de tipo portátil, que requieren menos metal y otros materiales esenciales, y al mismo tiempo, menos fuerza humana para su manejo y transporte, se usan mucho en las perforaciones a pocas y medianas profundidades



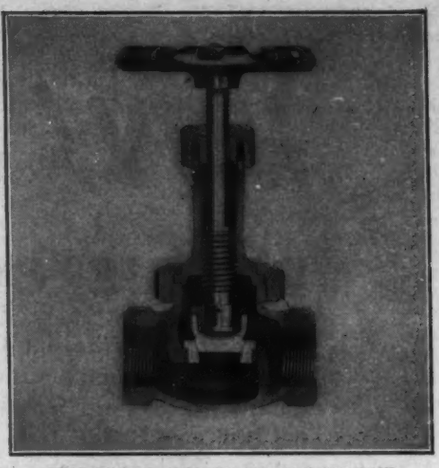
WALWORTH FIG. 95 BRONZE GLOBE VALVE

VÁLVULA DE GLOBO DE BRONCE WALWORTH, FIG. 95



WALWORTH LUBRICATED PLUG VALVE

VÁLVULA DE TAPÓN LUBRICADA WALWORTH



WALWORTH FIG. 225-P 500 BRINELL GLOBE VALVE

VÁLVULA DE GLOBO BRINELL 500, WALWORTH FIG. 225-P

WALWORTH SERIES 300 STEEL GATE VALVE

VÁLVULA DE COMPUERTA DE ACERO WALWORTH, 300 LIBRAS PRESIÓN

Since the beginning of the Petroleum Industry Walworth has manufactured valves, fittings, flanges and unions for oil field and refinery service. Walworth new catalog 42 will be sent on request.

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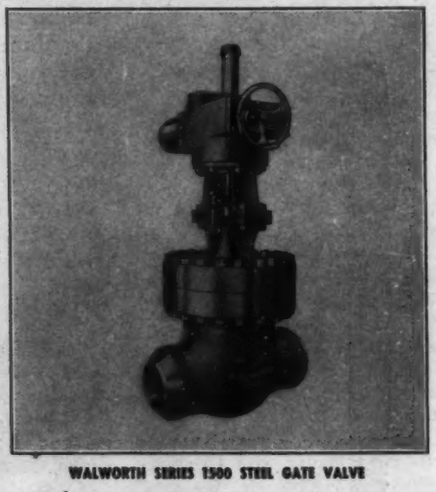

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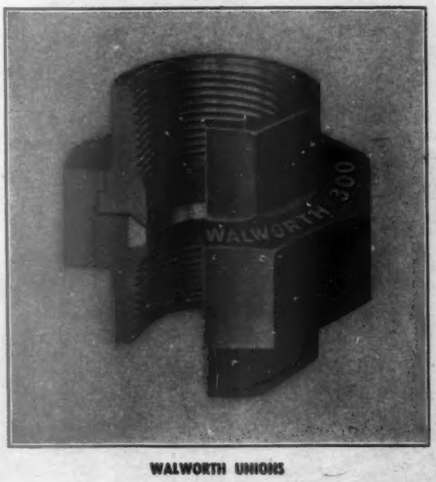

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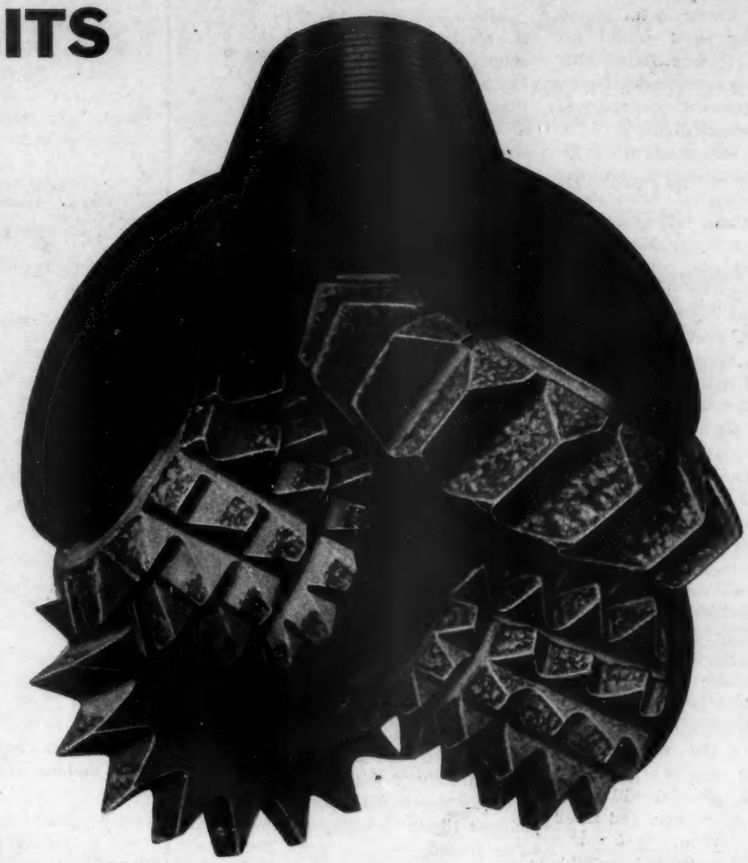

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and the results to be obtained with it, have been known for a number of years, but there were a number of details concerned with its use which were not thoroughly understood. One of these was the souring or fermentation of the drilling fluid. The hydrolized starch material would be added, and the desired results obtained. After a few days, the water loss would again go up and the drilling fluid would get steadily worse. It was found that bacterial action caused fermentation, something not formerly experienced when using inorganic drilling fluids.

Now that the fermentation can be prevented by addition of recently developed preservative chemicals, it is possible to take a salt-water drilling fluid with a water loss of 150 cc., treat it with the organic compound and bring the loss down to 10-12 cc. It can be brought even lower if desired. From 2 to 5 lb. of the commercial material per barrel of drilling fluid is the amount used. The cost of the material is reasonable in view of the results obtained.

It doesn't take a great amount of salt to affect the drilling fluid so that it cannot be treated by ordinary methods successful on fluids made from fresh water. As low as 0.5 per cent (5,000 p.p.m. of salt) in the drilling fluid will cause trouble. A drilling fluid containing 2 or 3 per cent salt is the hardest to treat as it has the characteristics of a fresh water mud but due to the electrolyte present there is a flocculation of the particles and a high water loss. Dilution of the drilling fluid and the addition of 3 to 5 lb. of the organic colloidal material will bring the water loss to 10-12 cc. and filter cake to 1/32 or 2/32 in.

Potentiality of the organic colloidal material has not yet been fully realized. As time goes on, it will be seen that it is as important as the discovery of the effect of bentonite on drilling fluid.

Successful drilling of a well through heaving shale from 8,750 ft. to 13,728 ft. with a drilling fluid made up of silicate of soda and brine shows the progress made in combating this problem.

Silicate of Soda and Brine for Drilling Fluid

The well was drilled to 9,613 ft. when trouble with heaving shale made further progress impossible. Mud used up to this time had a density of 11.8 lb. per gallon, funnel viscosity of 21.5 seconds (1,500 cc. in and 500 cc. out), water loss 12 cc. at 100 lb. and filter cake 3/22 in. at 100 lb. and 30 minutes.

The silicate of soda mud was made by salvaging the heavy solids of the water mud, adding some clay and weighting material, and then adding dry silicate of soda and salt through a hopper mixture. Gunning of the pits aided in the dissolving of the salts by the mud. Some water was added.

After displacing the water mud in the hole and circulating long enough to equalize the new mud, it showed a weight of 12.8 lb. per gallon, viscosity of 19 seconds, and liquid phase 60 per cent by volume silicate and 34 per cent by volume saturated salt solution. The silicate mud was mixed according to a formula worked out in the laboratory to give the desired physical and chemical characteristics.

After 5 months of drilling, the silicate mud had the following characteristics: Weight, 13.2 lb. per gallon; funnel viscosity, 31 seconds; flow-pipe temperature, 138° F.; Stormer viscosity, 57 centipoise; gel strength, 74 g.; volumetric analysis of liquid phase, 59.8 per cent silicate and 27.4 per cent saturated salt solutions; filtration, 22.5 cc. liquid and 5/32-in. cake in 30 minutes at 100 lb. pressure.

The mud was controlled by dilution with water to reduce the viscosity and gel strength, the addition of powdered silicate and salt and small amounts of weighting material, a 40-mesh vibrating screen, an 80-mesh screen, atmosphere spray cooling, and continuous gunning.

The new hole made after changing the mud gave no trouble but the indications were that three large cavities existed between 8,800 and 9,600 ft. These cavities filled with cavings in a semiplastice mass which did not interfere with drilling but did cause trouble while making a trip. When a bridge of these cuttings was encountered while going in the hole, it was necessary to wash out the accumulation slowly. If circulation caused the movement of too large a body of shale, the pipe would freeze. Increased pump pressure caused tighter packing of the shale. The remedy was to work the pipe loose without pump pressure, pull the bit above the bridge of cuttings and then circulate back down through it.

Another interesting practice which showed good results was inaugurated as the well approached total depth. After pulling 600 to 900 ft. of drill pipe, circulation would be established and maintained for 15 to 20 minutes. This seemed to eliminate or minimize the mechanical disturbance and tended to prevent the accumulation of shale in the cavities.

Slim-Hole Rigs

The greatest trend interrupted by the war has been the development of slim-hole rigs which first came into prominence less than 3 years ago. The economies to be obtained through smaller-diameter holes made this particularly attractive to the oil companies. So important are the savings that one company considered that it need not go to wider spacing if it followed a slim-hole drilling equipment program.

It appears the limit in hole size has been reached, temporarily at least. The smallest hole being drilled at the present time is 6¼ in. with most operators favoring 6¾ or 7 in. Later on there may be another step taken to reduce the hole size, al-

Silicato de soda y salmuera para flúido de perforación

El pozo se había perforado hasta 9.613 pies cuando la dificultad con el esquisto palpitante impidió seguir adelante. El lodo usado hasta este punto tenía una densidad de 11,9 libras por galón, viscosidad de 21,5 segundos (1.500 cc. de entrada y 500 cc. de salida), pérdida de agua de 12 cc. a 100 libras y 30 minutos, y costra filtrante de 3/32 de pulgada a 100 libras y 30 minutos.

El lodo de silicato de soda se hizo salvando los sólidos pesados del lodo de agua, agregando un poco de grada y material de peso, y añadiendo finalmente silicato de soda seco y sal con la ayuda de una mezcladora de tolva. Las sales se disolvieron bien en el lodo, y se agregó un poco de agua.

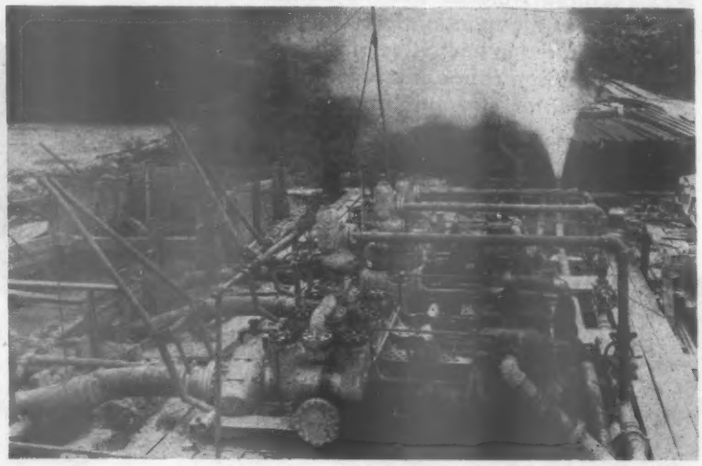
Después de desplazar el lodo de agua en el agujero y de aplicar circulación por tiempo suficiente para compensar el lodo nuevo, el flúido mostró un peso de 12,8 libras por galón, viscosidad de 19 segundos y fase líquida de 60 por ciento, por volumen, de silicato, y 34 por ciento, por volumen, de solución salina saturada. El lodo de silicato fué mezclado de acuerdo con una fórmula desarrollada en el laboratorio, para dar las características físicas y químicas deseadas.

Después de cinco meses de perforación, el lodo de silicato tenía las características siguientes: peso, 13,2 libras por galón; viscosidad, 31 segundos; temperatura de tubería, 138 grados F,; viscosidad Stormer, 57 centipoises; resistencia gelatinosa 74 g.; análisis volumétrico de la fase líquida, 59,8 por ciento de silicato y 27,4 por ciento de soluciones salinas saturadas; filtración,. 22,5 cc. líquida y costra de 5/32 de pulgada en 30 minutos a 100 libras de presión.

El lodo fué regulado por dilución con agua, para reducir la viscosidad y resistencia gelatinosa, la adición de silicato y sal en polvo y pequeñas cantidades de material de peso, una criba vibratoria con malla de 40, una criba con malla de 80, enfriamiento por rocío atmosférico y contínua agitación.

La nueva sujeción obtenida a continuación del cambio del lodo no produjo ningún inconveniente, pero había indicación de la existencia de tres grandes cavidades entre los 8.800 y los 9.600 pies. Estas cavidades, ocupadas por derrumbes en una masa semiplástica, que no perturbaban la perforación, causaron, sin embargo, dificultad, en los viajes o pasadas por el pozo. Cuando se presentaba un puente de estos despojos, al descender, era necesario lavar lentamente la acumulación. Cuando la circulación causaba el movimiento de un cuerpo demasiado grande de esquisto, el tubo se inmovilizaba. La mayor presión de bomba aumentaba el aprieto del esquisto. El remedio fué desprender el tubo, sin presión de bomba, colocar la barrena encima del puente de despojos y luego lanzar de nuevo la circulación.

Otra práctica interesante, que dió buenos resultados, se aplicó al pozo cuando se aproximó a su profundidad total. Después de retirar de 600 a 900 pies de tubería de perforación, se establecía la circulación y se le mantenía de 15 a 20 minutos. Esto parecía suprimir o reducir la perturbación mecánica y tendía a evitar la acumulación de esquisto en las cavidades.



Double-acting triplex pumps give greater fluid capacity, use less steam, increase the rate of penetration and decrease the number of bits required to drill a well

Bombas de dobles efectos triples proven mas capacidid de flúido, usen menos de vapor, aumenten el rato de penetración y decrecen el numero de barrenas neciciten para perforar uno pozo

Aparejos de perforación de agujero angosto

La tendencia más importante de todas las interrumpidas por la guerra ha sido el desarrollo de aparejos de perforación de agujero angosto, el cual llamó la atención de la industria hace menos de 3 años. Las economías que se obtienen de la per-

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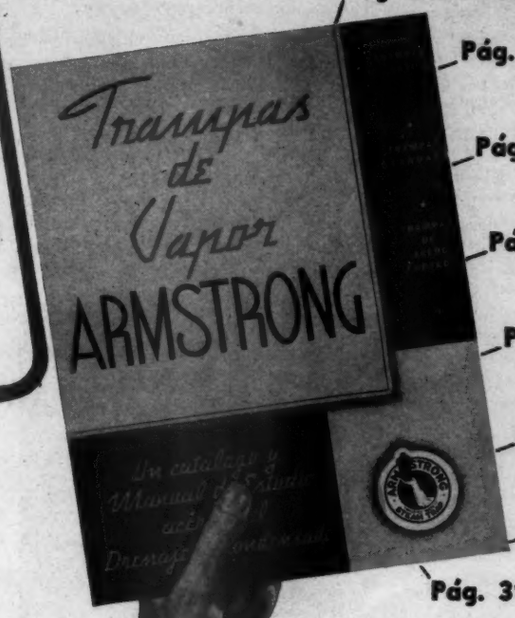


Pág. 2-3 "Hechos Acerca de Trampas de Vapor"

Pág. 4-15 "La Trampa Armstrong de Balde Invertido"

Pág. 16 "Diagrama de Capacidad de Trampas de Vapor"

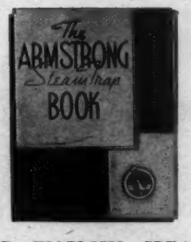
Pág. 17 "Cómo Usar el Diagrama de Capacidad"

Pág. 19 "Drenaje de cañerías maestras de vapor"

Pág. 20 "Drenaje de serpentinas para calefacción"

Pág. 24 "Tubos y serpentinas sumergidas"

Pág. 31 "Manutención e Instalación de las Trampas"



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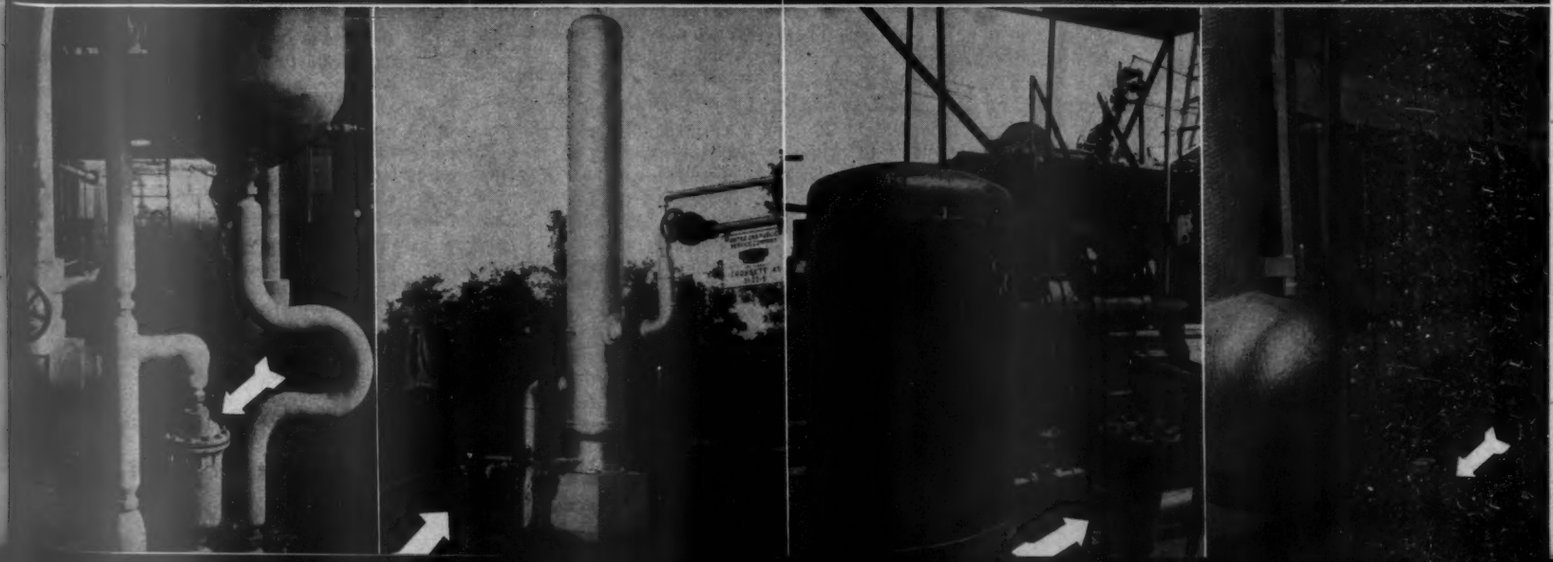


though it probably will be a number of years to come.

The same limit has not been reached by slim-hole rigs as the work of development of suitable equipment for slim-hole drilling has only begun. A number of manufacturers and oil companies are cooperating on this problem to obtain a rig which will incorporate maximum efficiency while drilling with a minimum of moving time.

The most revolutionary machinery development was the slim-hole rig put in use by Shell Oil Co., Inc., during the year. This rig was self-propelled, while moving the drilling engines providing the motive power. It was equipped with three supercharged engines operating 1,800 r.p.m. The superchargers operated 18-in. mercury vacuum and over long periods the engines develop 150 to 175 hp. each. Each engine is equipped with its own enclosed cooling system.

The engines and bottom section of the mast hoist are all mounted on one six-wheel unit. The drive is on all wheels through a takeoff from the rig drive mechanism which connects to a specially designed truck-driving mechanism. A seat and a steering post and driving controls are located on the end opposite the draw works. The 120-ft. mast-type derrick comes apart in three sections, the base resting on the hoist unit, the middle section on the wheel-mounted pump unit and the top section on auxiliary carrier.

Another unusual feature of the rig is the floating crown block which is pulled into the lower mast section before the mast is taken apart for moving. This eliminates stringing of the blocks while rigging up.

The rig is designed for drilling economically to 7,500 ft. with 3½-in. drill pipe. It is equipped with special air controls which have both automatic and a flexible speed regulation.

The principal consideration in the design of the rig was that it was to be used on fairly deep holes (5,000 ft.) and in a territory where the rate of penetration is not high. It was estimated that the rig would have to move 15 or 20 times a year. The new rig is designed so that it may be torn down, moved a reasonable distance, rigged up and put in operation in less than 8 hours. This means that in a year's time it will be possible to drill an additional well over what could be drilled if conventional equipment were to be used.

The rig has numerous other features which will not be mentioned here. These were covered in an article in the January 15, 1942, issue, Page 33, of The Oil and Gas Journal.

Multizone Completions

Multizone completion of wells in areas producing from more than one horizon has been attracting increasing attention for the past 4 years. Many engineers contend that in the future the method will be to drill the first well through the complete sedimentary section, thus outlining the productive possibilities of the field. Future wells drilled would tap several and possibly all of the productive zones.

Up until this year, there were two methods used for multiple completion. The first was to run a section of aluminum alloy pipe or black merchant pipe opposite the upper producing zone. This later was re-

Portable machines for repairing and maintaining drill pipe in the field are growing more popular with shortages of materials and transportation

Máquinas portátiles para la reparación y conservación de tubo de perforación gozan de creciente popularidad en los campos petrolíferos, debido a la escasez de materiales y transporte

foración de agujeros de menor diámetro despertaron inmediatamente el interes de las compañías de petróleo. Tan importantes son las economías, que una compañia pensó que no había necesidad de perforar a diámetros más grandes si se siguiera por norma un programa de perforar agujeros angostos.

Parece que se ha llegado al limite en lo tocante al diámetro del agujero, por lo menos, al presente. Los agujeros más pequeños que se están perforando actualmente tienen 6¼ pulgadas, pero casi todos los interesados prefieren los de 6¾ o 7 pulgadas. Más tarde se dará otro paso para reducir el tamaño del agujero, pero probablemente pasarán varios años de que presenciemos este interesante acontecimiento.

Por otra parte no se ha llegado a un límite en lo tocante a aparejos de perforación de agujero angosto, pues el trabajo de desarrollo de equipo bien adaptado a esta clase de perforación acaba de empezar. Varios fabricantes y compañías de petróleo están trabajando en este problema, para producir un aparejo que ofrezca un rendimiento máximo en la perforación y un tiempo mínimo en transporte o movimiento de un punto a otro.

El más revolucionario desarrollo en maquinaria fué el aparejo de perforación de agujero angosto, usado por la Shell Oil Co. el año pasado. Este fué un aparejo automóvil, cuya fuerza motríz para su propulsión, la suministraban sus motores de perforación. Estaba provisto de tres motores sobrecargados, que funcionaban a 1800 rpm. Los sobrecompresores funcionaban a un vacío de mercurio de 18 pulgadas, y durante largos períodos de tiempo los motores desarrollaban de 150 a 175 cdf. cada uno. Cada motor tenía su propio sistema de enfriamiento muy bien protegido.

Los motores y la sección del fondo de la grúa de mástil iban todos instalados en un bastidor de seis ruedas. Todas las ruedas tenian propulsión a través de un tomafuerza del mecanismo de movimiento del aparejo, unido a un mecanismo de propulsión de camión especialmente proyectado para este fin. Un asiento, una columna de dirección y los gobiernos de marcha estaban dispuestos en el extremo al frente de los tornos de extracción. La torre de tipo de mástil, de 120 piés, se desarmaba en tres secciones, con la base descanzando sobre el montacargas, la sección central sobre la bomba montada en ruedas, y la sección superior, sobre un soporte auxiliar.

Otro rasgo extraordinario de este aparejo fué caballete portapoleas de tipo flotante, que se retraía a la sección inferior del mástil antes de que se desarmara este último para su transporte. Esto suprimía mucho trabajo en el alistamiento del aparejo.

Este aparejo fué proyectado para perforar economicamente hasta 7.500 pies con tubo de perforación de 3½ pulgadas. Fué equipado con gobiernos neumáticos especiales, que tenían regulación de velocidad automática y manual.

La consideración principal en la construcción de este aparejo fué que iba a usarse en agujeros regularmente profundos (5.000 pies) en una región en que la rapidez de la penetración no era alta. Se calculó que el aparejo tendría que moverse de un punto a otro, de 15 a 20 veces al año. El nuevo aparejo fué, por lo tanto, construido de modo que pudo desarmarse, trasladarse a una distancia racional, armarse de nuevo y ponerse a trabajar, todo en menos de 8 horas. Esto significa que en el espacio de un año será posible perforar un pozo más que lo que podría hacerse dependiendo del equipo de tipo corriente u ordinario.

El aparejo aquí aludido tenía muchos otros rasgos ventajosos, que no describiremos aquí de nuevo, pues fueron explicados en un artículo que apareció en la página 33 del número del 15 de enero de 1942 de nuestra revista The Oil and Gas Journal.

Explotación multizonal

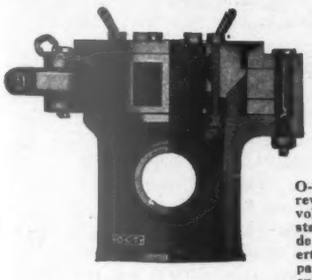
La explotación multizonal de pozos en lugares que producen de más de un horizonte ha estado despertando creciente atención estos últimos 4 años. Muchos ingenieros sostienen que el método del futuro será perforar el primer pozo, atravesando todo la sección sedimentaria, para obtener así una idea bien aproximada de las posibilidades productivas de todo el yacimiento. Los pozos perforados después pasarian algunas o bien todas las zonas productivas.

Hasta el presente año, se han seguido dos métodos para la terminación múltiple. El primero ha sido meter una sección de tubo de aleación de aluminio o de tubo de otro material a proposito, al frente de la

MAKIN' HOLE

OR RUNNING PIPE UNDER PRESSURE....

O·C·T PREVENTERS



O-C-T TYPE "D" BLOW-OUT PREVENTER with regular packoff is generally installed above ram type preventers to provide an all-important secondary seal and to relieve the ram packers of wear while working pipe under pressure to prevent sticking. Available in either flanged or threaded body models.

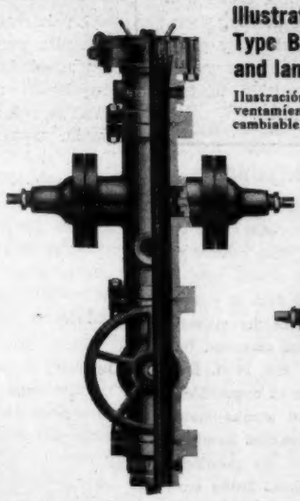
O-C-T, TIPO "D", Preventor de reventamiento de los tubos, con envoltura regular, es generalmente instalado encima de los preventores de atraque para proveer una cubierta secundaria importantisima, y para aminorar el desgaste de las cuñas atracadoras mientras se trabajan los tubos bajo presión evitando de esta manera el atascamiento de éstos. Se fabrican dos modelos, uno de superficie con rebordes, y otro filiforme.

O-C-T TYPE "D" BLOWOUT PREVENTER with stripper type pack-off which interchanges with regular pack-off shown above. This preventer is widely used for running pipe under pressure (see illustrations at right). Stripper pack-off readily passes pipe collars, yet provides a pressure-tight seal around pipe. Available in either flanged or threaded body models.

O-C-T, TIPO "D", Preventer de reventamiento de los tubos, con envoltura compresora, intercambiable con la envoltura regular que se ilustra arriba. Este Preventor es extensamente usado para pasar tubos bajo presión (vésse la ilustración de la derecha). La envoltura cambiable permite libremente el paso de los anillos de juntura de los tubos, sin embargo, proporciona presion hermética alrededor de los tubos. Se hacen dos modelos, filiforme o con rebordes.

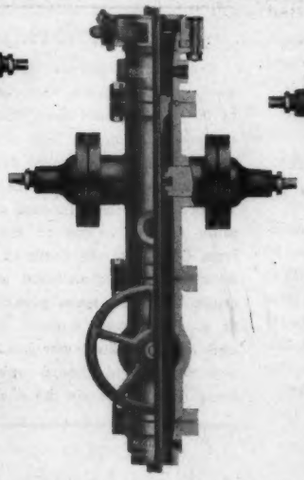
Illustrating use of O-C-T Stripper Type Blowout Preventer for running and landing casing or tubing.

Ilustración de como se usa el Preventor de reventamiento de los tubos, tipo de envoltura cambiable, para pasar y colocar cubiertas y tubos.



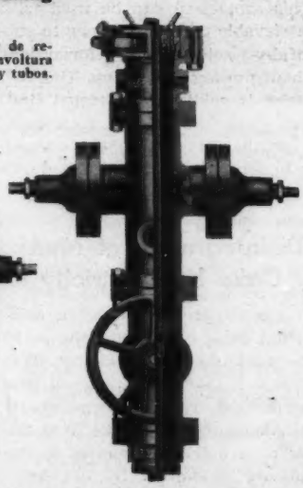
Open ram type preventer and run pipe to bottom through O-C-T Stripper Type Preventer, which readily passes pipe collars. Thus, no wear is imposed on packers of ram type preventer.

Abra el preventor de atraque y pase el tubo hasta el fondo por entre el Preventor O-C-T de tipo de envoltura cambiable, el cual permite libremente el paso de los anillos de union de los tubos. De esta manera se evita el desgaste de los compresores o cuñas del otro aparato preventor.



Stripper pack-off is easily and quickly removed from O-C-T Preventer to permit passage of casing or tubing hanger while ram type preventer is closed.

La envoltura se puede remover rápida y fácilmente del Preventor O-C-T, y además, permite el paso de las cubiertas o de los soportes de suspensión de los tubos mientras que el otro preventor esta cerrado.



Re-insert stripper type pack-off in O-C-T Preventer, open ram type preventer, and lower hanger to suspension point . . . thus, maximum protection against blowouts and practically no wear on ram type preventer.

Re-inserte la envoltura compresora cambiable en el Preventor O-C-T, abra el otro preventor y baje el soporte a un punto de suspension . . . asi obtendrá máxima protección contra el reventamiento de los tubos, y casi ningun desgaste del preventor de atraque.

QUALITY O-C-T PRODUCTS

"Selling Through Leading Supply Stores"

OIL CENTER TOOL COMPANY

HOUSTON, TEXAS, U·S·A

Export Representative: Val R. Wittich, 30 Rockefeller Plaza, New York, N. Y.

Oficina de representaciones extranjeras: Calle Lavalle 710, Buenos Aires, Argentina.

moved mechanically. The second was to run a magnesium alloy pipe section opposite the upper pay and later remove it with acid.

A new method of completion has now been introduced. This consists of running the proper size liner in the lower portion of an open hole and cementing it in place. The liner is run on the tubing and held there while cement is placed around it. After the cement is set, another liner is run to the proper depth, leaving the interval between this and the lower liner exposed. This process is repeated until there is a succession of liners opposite the unproductive sections in the hole with the productive sections exposed. After the liner immediately below the uppermost pay section has been run, the remainder of the hole is protected by a string of casing run and cemented in the regular manner. Each of the producing zones can then be shot, acidized, or both, and then put on production.

The principal tool needed for this type job is a left-hand thread, sleeve-opening port sub which is placed between the tubing and the duplex casing shoe on the bottom of the liner. After the cement has been placed behind the liner, the ball is dropped and the ports in the sub opened. This allows circulation and the flushing out of the cement without endangering the set of the slurry behind the liner.

This same tool can be used with a retrievable cement retainer to successfully acidize two formations without pulling the tubing. The lower zone is acidized and tested first, after which the cement retainer is set and the port-opening sub opened. The upper zone is then acidized and tested.

Disintegration of Mud Cake by Electricity

The colloidal particles of a drilling-fluid cake have been shown to have negative electrical charge. This condition is taken advantage of in a new method, tried experimentally, to eliminate the filter-cake from the walls of a hole, particularly in the producing formation. By the application of the proper amount of current, the colloidal particles can be made to leave the filter cake, weakening it and causing it to disintegrate. No chemicals are needed.

The negative charge is maintained in the formation and the filter cake by grounding the electrical generator. The casing can be used for the ground. Insulating sections run in the tubing allow the current to be directed at selected formations. Some of the colloidal particles are attracted to the positive electrical field, others drop to the bottom of the well and the filter cake is weakened so it disintegrates.

Automatic Pipe Slips

An attempt was made during the year to adapt automatic pipe slips to rotary drilling. These would replace the regular slips which are handled by the floor men on the drilling crew.

The trial was partially successful and the mechanism for lifting the slips out of the rotary table and putting them in place worked satisfactorily. This mechanism is controlled by the driller from his position on the rig. The principal difficulty is the design of a satisfactory gripping element in the slip. Those used during the trial were an angle-unit, serrated type. These were quickly dulled and unless they were taken to a shop and sharpened, there was danger of dropping the drilling stem. Development of a satisfactory gripping element will be necessary before tests of the operation of the automatic slips is resumed.

THE COVER PICTURES

They tell a sequence story about transporting and shipping Venezuela crude oil to the refining and marketing centers of the world. Atop the hills which form a background for the tanker dock at Puerto la Cruze are vital parts of the system. Tropical trees and flowers surround the main control valves on the 16-in. line from Oficina to the northern coast. Electrically driven centrifugal pumps move crude from the main pipe-line terminal to loading tanks through the manifold and lines at the lower left. Crude cargoes are loaded aboard tankers through these lines alongside the dock.

sección productiva de arriba, y sacarla, más tarde, mecanicamente. El segundo ha sido meter una sección de tubo de aleación de magnesio, al frente de la sección productiva de arriba, y quitarla más tarde con ácido.

En pozos revestidos ya con tubería de acero, las zonas superiores podrían exponerse con una herramienta de fresar de extensión.

Un nuevo método de terminación se ha introducido ahora. Esta nuevo método consiste en meter un forro tubular de correcto tamaño en la parte inferior del agujero abierto y cementarlo en ese punto. El forro tubular se baja por el entubamiento y se sujeta en ese punto al fondo mientras se le echa cemento a su alrededor. Después de endurecido el cemento, se baja otro forro a una profundidad correcta, dejando expuesto el intervalo entre este forro y el de más abajo. Este procedimiento se repite hasta que hay una sucesión de forros al frente de las secciones inproductivas en el agujero, quedando expuestas las productivas. Después de colocado el forro inmediatamente debajo de la sección productiva más alta, el resto del agujero se protege por una cadena de tubería metida y cementada de la manera ordinaria. Cada una de las zonas productivas podrá entonces barrenarse, acidificarse o recibir ambas cosas y ponerse luego en producción.

La herramienta principal que se necesita para este tipo de trabajo es un acoplador de manguito de rosca izquierda, de abertura trasera, el cual se coloca entre el entubamiento y la zapata duple de tubería al fondo del ferro tubular. Después de colocado el cemento detrás del manguito, se deja caer la bola y se abren así las aberturas del acoplador. Esto permite la circulación y la salida del cemento sin peligro de perturbar el endurecimiento del cemento detrás del forro.

Esta misma herramienta puede usarse con un retenedor de cemento recuperable, para acidificar bien dos formaciones, sin quitar el entubamiento. La zona inferior es acidificada primero y ensayada, y a continuación se coloca el retenedor de cemento y se abren las aberturas del acoplador. Luego se acifica y ensaya la zona superior.

Desagregación de la costra de lodo por la eléctricidad

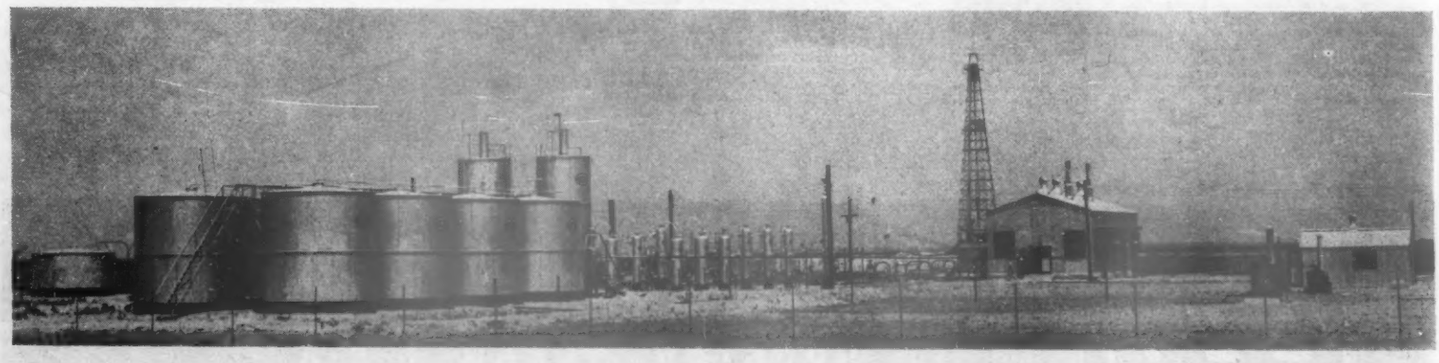
Las partículas coloidales de la costra de un flúido de perforación han demostrado que tienen carga eléctrica negativa. Se ha sacado provecho de esta condición en un nuevo método, probado por vía de experimento, para eliminar la costra filtrante de la pared de un agujero. particularmente en la formación productiva. Por la aplicación de una correcta cantidad de corriente eléctrica, se puede hacer que las partículas coloidales se separen de la costra, debilitándola y causando su desagregación. No se necesitan substancias químicas.

La carga negativa se mantiene en la formación y la costra poniendo a tierra el generador eléctrico. La tubería puede usarse para las conexión a tierra. Secciones aisladoras bajadas por el entubamiento permiten dirigir la corriente a formaciones determinados. Algunas de las partículas coloidales son atraidas al campo positivo electrificado, otras caen al fondo del pozo y la costra, así debilitada. sufre finalmente desagregación.

Cuñas o manguitos de tubo automáticos

Durante el año se trató de adaptar cuñas o manguitos automáticos de tubo a la perforación rotativa. Estos substituirían a los manguitos o cuñas corrientes, que se manejan por los operarios en la plataforma.

El ensayo tuvo un éxito parcial, pues el mecanismo para levantar las cuñas afuera de la plataforma de la rotativa y colocarlos en su sitio, trabajó satisfactoriamente. El mecanismo se gobierna por el perforador. desde su puesto en el aparejo. La dificultad principal se encuentra en la construcción de un satisfactorio elemento de agarro en el manguito. Los usados en el ensayo eran del tipo angular con dentadura. Se desgastaron pronto, y a menos que se llevaran al taller para afilarse, existía el peligro de que se soltara y cayera el vástago de perforación. Será necesario el perfeccionamiento de un elemento de agarro satisfactorio antes de que se lleven de nuevo a cabo ensayos adicionales del funcionamiento de manguitos automáticos.



General view of a pressure maintenance and recycling operation in the Gulf Coast section of Texas

Vista general de la operación de conservación de presión y recirculación en la sección de la Costa de Golfo de Texas

Trends in Production Practices

Tendencias en Practicas de Produccion

Introduction

PRODUCTION practices have changed materially during the past year due mainly to the unsettled conditions. From a period of plenty of both available oil and equipment, the industry is faced with a definite scarcity of material and a possible (although not immediate) shortage of crude oil.

This change has placed a greater emphasis on conservative and sound operating practices and at the same time has given a strong impetus to production technology. With the material lacking to develop new fields, increased efficiency, secondary recovery and reservoir control become of paramount importance.

A number of fields, scheduled for water floods or gas drives in the more or less indefinite future, have been put in operation. Other pools, where pressure maintenance was being considered, have actually had their programs established and put into operation in a comparatively short time. Everyone in the industry is now conscious of the necessity of obtaining as many barrels of oil as possible from existing facilities. Most of these programs are just getting under way but already many new problems have developed.

During the coming year, the engineers and operating men in the industry will probably be faced with more problems than at any time in the past. The solution to many of these difficulties will result in the development of equipment which was not being considered a short time ago.

The changes brought on by the war have affected numerous companies, but in so far as possible, they are still attempting to carry on with maximum efficiency. The lack of exploitation campaigns will provide many engineers with the opportunity to carry on field tests and field experiments

Steam Generating Units

Small portable steam-generating units are coming into wider use in the oil production field. These units are capable of high capacity steam delivery a short time after being put into operation.

One of the outstanding applications for this type of equipment has been the removal of paraffin from tubing in wells. The steam generator is used to heat distillate which is then pumped into the well. The hot distillate dissolves the paraffin in a much shorter time than cold fluid.

Another use has been the cleaning of tank batteries. In this case, the steam is used with an injector and the heated water sprayed on the tank. Cleaning solution is added to the water to aid in the removal of the grease and dirt. Three men can clean the exterior of a high 500-bbl. tank in about 1 hour using this type of equipment.

Heating of Power Oil for Hydraulic Pumping Units

In some cases, one of the incidental operating problems of hydraulic pumping units is the heating of the power oil. This is done to increase the barrels per hour output of the pump without a greater horsepower requirement. For instance, in one case heating of the power oil dropped the required pressure approximately 33⅓ per cent.

One method used to effect the necessary heating of the oil is to pass it through a heat exchanger the heat source being the engine-jacket cooling water. This means that the water in the engine jacket and radiator must be kept at a fairly constant and fairly high temperature.

Use of manual control of a screen on the radiator did not produce the desired results but the installation of a variable pitch radiator fan has proven successful. The fan is operated through double V-belts at approximately 750 to 900 r.p.m. The fan has blades which are automatically adjusted for temperature changes in the water of the radiator.

The pitch of the fan blades is regulated by a thermostat in the fan hub. As the temperature of the air coming through the radiator decreases, the pitch of the fan blades is reduced, It is possible to hold the temperature of the water in the radiator to a plus or minus 5° range. The effect of maintaining a con-

Introduccion

LOS métodos de producción han sufrido un cambio muy notable durante el año pasado, debido principalmente a condiciones indecisas. De un período de abundancia, tanto en petróleo como en equipo de trabajo, la industria ha pasado o otro que le presenta una escasez definida de material y una posible, aunque no inmediata carestía de petróleo crudo.

Este cambio ha puesto un mayor énfasis sobre los métodos de explotación racionales y previsores, y al mismo tiempo ha dado fuerte impulso a la tecnología de la producción. Debido a la falta de materiales para el desarrollo de nuevos yacimientos, han crecido en importancia fundamental el rendimiento efectivo, la regeneración o recuperación secundaria y el gobierno del depósito.

Varios yacimientos, incluidos en un programa de extracción por corriente de agua o aplicación de gas, por desarrollarse en un futuro más o menos indefinido, están ahora bajo explotación. Otros yacimientos, cuya conservación por presión, estaba sometida a consideración, tienen ya programas establecidos, y en un tiempo comparativamente corto, se ha emprendido su explotación. Todo el mundo, en la industria, se da cuenta cabal de la necesidad de obtener el mayor número posible de barriles de petróleo de las facilidades existentes. Casi todos estos programas se han puesto ultimamente en ejecución, y se han desarrollado ya muchos nuevos problemas.

Durante el próximo año, los ingenieros y los explotadores de la industria se van a ver probablemente frente a frente de más problemas que nunca. La solución de muchas de estas dificultades resultará en el desarrollo de un equipo insospechado hasta hace poco tiempo.

Los cambios introducidos por la guerra han tenido efecto directo sobre numerosas compañías, pero todas ellas están tratando, por todos los medios posibles, de continuar el trabajo con máximo rendimiento. La ausencia de campañas de explotación procurará a muchos ingenieros la oportunidad de llevar a cabo ensayos y experimentos prácticos.

Grupos generadores de vapor

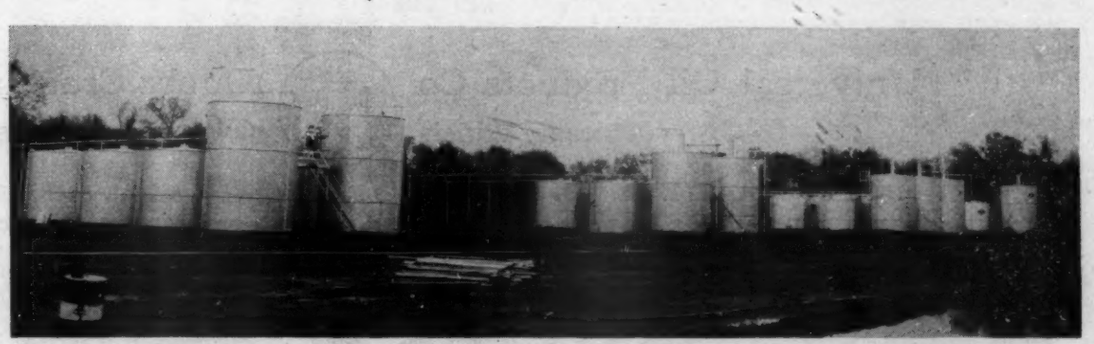
En el campo de la producción de petróleo se está extendiendo el uso de pequeños grupos portátiles de generadores de vapor. Estos grupos tienen capacidad para generar una gran cantidad de vapor en poco tiempo, después de puestos a trabajar.

Una de las principales aplicaciones de este tipo de equipo ha sido la extracción de la parafina de la tubería de los pozos. El generador de vapor se usa para calentar el destilado que se inyecta en el pozo. El destilado caliente disuelve la parafina en menos tiempo que el líquido frío.

Otro uso ha sido la limpieza de tanques o depósitos. En este caso, el vapor se usa con un inyector y el agua caliente se rocía en el tanque. Una solución de limpieza se añade al agua, para ayudar en la remoción de la grasa y suciedad. Tres hombres pueden limpiar el exterior de un tanque alto de 500 barriles en como 1 hora con la ayuda de este tipo de equipo.

Calentamiento de petróleo de fuerza para bombas hidráulicas

En algunos casos, una de los problemas inherentes del funcionamiento de las bombas hidráulicas es el calentamiento del petróleo de fuerza.



Maximum flexibility, conservation of manpower and minimum use of critical materials have tended to concentrate installations of production-tank batteries

La máxima adaptación, la conservación de fuerza humana y el uso mínimo de materiales esenciales, han tenido la tendencia a instalaciones concentradas de baterías de tanques de producción

Catálisis para la guerra y la paz

Catalysis for war and peace

Hace años cuando el procedimiento Dubbs de descomposición piregenada "cracking" vino a ser en todo el mundo, la piedra angular en la industria de refinación de la gasolina, los directores investigadores de la Universal presintieron que la descomposición térmica, aunque todavía de utilidad, tenía sus limitaciones. Ellos pusieron su atención en las posibilidades de la catálisis.

Se trajeron a la Universal, químicos de fama mundial, y se empezó un amplio programa de investigaciones en este campo muy poco conocido.

Los resultados son todos de importancia. Cada descubrimiento era un acicate para continuar el estudio, una invención seguía tras otra.

Se desarrollaron procedimientos catalíticos que mejoraron grandemente la calidad y el rendimiento de combustible para motor y con los cuales ahora se están produciendo gasolina para la aviación de un índice octánico de 100 y otros productos para ayudar a las Naciones Unidas a ganar la guerra.

Después de la guerra, tales procedimientos serán esenciales a la industria moderna de refinación de la gasolina.

Nos será grato suministrar informes completos a quienes los soliciten.

Years ago when the thermal Dubbscracking process had become the backbone of the refining industry the world over, Universal research leaders sensed that thermal cracking had its limitations, though still useful They turned their attention to the possibilities of catalysis

World famous chemists were brought to Universal and a broad research program in this little known field was begun

The results are all important Each discovery was a challenge to further study, one invention followed another

Catalytic processes were developed that greatly improved quality and yield of motor fuel and which are now producing 100 octane aviation gasoline and other products to help win the war for the United Nations

And they will be essential to a modern refining industry after the war

For full information we invite you to write

Universal Oil Products Co
Chicago, Illinois

Dubbs Cracking Process
Owner and Licensor

INSTITUTO DE TECNOLOGIA DE PETROLEO DE REFINADORES
THE REFINERS INSTITUTE OF PETROLEUM TECHNOLOGY

stant temperature on engine efficiency and oil consumption is obvious.

Submergible Magnetic Strain Gage

A new instrument for measuring the instantaneous and sustained load on a sucker-rod string has been developed. The principal element is a magnetic strain gage run on the bottom of the sucker rods and a magnetic oscillograph at the surface. The complete unit consists of the magnetic strain gage control box with filter, the recording and indicating instruments and a supply of electrical current.

The principle is the transformation of small displacements in the sucker rods into the readings on an electrical instrument. The instrument was designed originally to determine the load on the sucker-rod string just above the pump.

Two of the instruments were used in the field for 6 months, testing wells. A check of the instruments at the conclusion of the test showed that the calibration had not changed.

Purification of Hydrogen Sulfide Gas

Up until recent years, the major use for sulfide gas, either dry or casing head, was the manufacture of carbon black. Several plants for the sweetening of such gas so it can be used for commercial purposes have recently gone into operation. Two of these plants are located in Arkansas where there is a substantial reserve of what was formerly a more or less useless product.

The produced gas is stripped of its liquid content in separators and is recompressed and then passed through a water solution of monoethanolamine. Gas containing as high as 5,000 grains of H_2S per 100 cu. ft. can be treated so that it will show less than 1/10 grain.

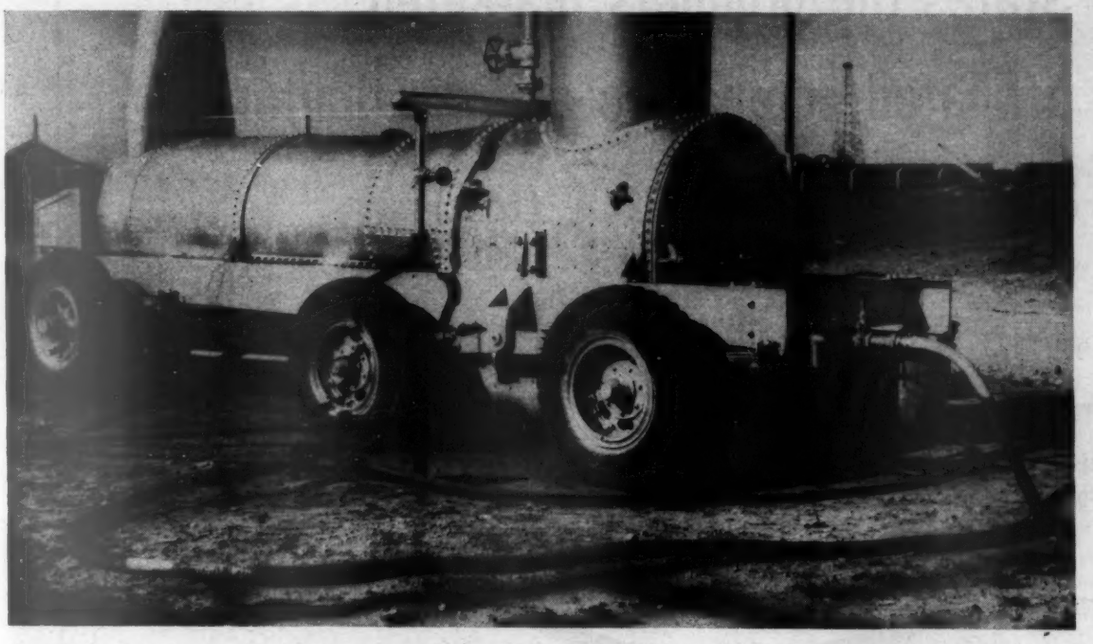
After being sweetened the gas is again compressed and stripped of natural gas and butane and is then dehydrated before being put into the transmission. A solution of amines and glycols is used for the dehydrogenation.

The other stream from the sweetening plant is processed and is treated to recover the sulfur. Pilot plant tests show that approximately 80 per cent of the sulfur and hydrogen sulfide can be recovered in the form of brimstone. Just what form and importance the recovery of sulfur will take in this process is not known at the present time.

Electrical Chlorination of Salt Water for Disposal Purposes

Operators of salt-water-disposal projects received a severe setback when war priorities forced the price of chlorine upward and eventually deprived oil companies of their source of supply. The chlorine was necessary in salt-water-disposal plants to prevent the formation of sulfide-reducing bacteria. These bacteria produced a sludge which would plug the disposal zone and force injection pressures upward.

Electrolytic equipment was installed at several plants to manufacture the necessary chlorine from the salt water. A battery of graphite plates, approximately 3½ ft. by 6 in. by 1 in. in thicknesses were mounted on wood blocks with Bakelite being used for spacers. Plates



A type of portable steaming unit used extensively in modern producing practices for removing paraffin, heating distillate before its injection into wells, for cleaning tanks and other similar services

Este es un tipo portátil de calentar a vapor, que se usa mucho en las modernas prácticas de extraer la parafina, calentar destilados antes de su inyección en los pozos, limpiar tanques y otros trabajos similares

Esto se hace para aumentar el rendimiento de barriles por hora de la bomba sin un mayor requisito de fuerza motríz. Por ejemplo, el calentamiento del petróleo de fuerza redujo, como en 33⅓%, la presión requerida, en un caso reciente.

Un método seguido para efectuar el necesario calentamiento del petróleo es pasar éste por un cambiador de temperatura, aprovechándose el agua de enfriamiento de la camisa o canalización del motor como fuente de calor. Esto quiere decir que el agua en la canalización y el radiador del motor debe conservarse a una temperatura bastante elevada y constante.

El uso de gobierno manual de una pantalla en el radiador no produjo los resultados deseados, pero la instalación de un ventilador de radiador de paso variable ha dado efecto satisfactorio. El ventilador es accionada por dobles correas en V a una velocidad de 750 a 900 r.p.m. El ventilador tiene paletas que se ajustan automaticamente a los cambios de temperatura del agua en el radiador.

El paso de las paletas del ventilador está regulado por un termostato dispuesto en el cubo del ventilador. A medida que se reduce la temperatura del aire que pasa por el radiador, se reduce el paso de las paletas del ventilador. Es posible conservar la temperatura del agua en el radiador dentro de una variación de 5 grados más o menos. El efecto de conservar constante la temperatura, sobre el rendimiento del motor y el consumo de petróleo, es, por supuesto, muy beneficioso.

Indicador magnético de tensión sumergible

Se ha perfeccionado un nuevo instrumento para medir la carga instante y sostenida de una cadena de varillas de bomba. El elemento principal és un indicador magnético de tensión o esfuerzo, pasado por el fondo de las varillas de bomba y un oscilógrafo magnético, en la superficie. El grupo completo comprende la caja de gobierno del indicador magnético de tensión, con filtro, los instrumentos registradores y de indicación, y un abastecimiento de corriente eléctrica.

El principio en que se basa este nuevo instrumento es la transformación de pequeños desplazamientos en las varillas de boma, en acusaciones en un instrumento eléctrico. El nuevo indicador fué originalmente proyectado para determinar la carga sobre una cadena de varillas de bomba inmediatamente arriba de la bomba.

Dos de los instrumentos se usaron practicamente por 6 meses, en ensayos de pozos. Una verificación de los instrumentos a la conclusión del ensayo mostró que la graduación no había sufrido ningún cambio.

Purificacion del gas de súlfuro de hidrógeno

Hasta hace pocos años, la principal utilización del gas de súlfuro de hidrógeno, en forma seca o líquida, se hallaba en la manufactura de negro de carbón. Ultimamente se han establecido varias fábricas purificadoras de semejante gas, las cuales lo preparan para su aprovechamiento en fines comerciales. Dos de estas fábricas están establecidas en Arkansas, donde hay una buena cantidad de este producto, que hasta hace poco, se tenía por álgo casi inservible.

El gas es desprovisto de su contenido líquido, en separadores a propósito, luego es recomprimido y finalmente pasado por una solución acuosa de monoetanalamina. Gas que contiene hasta 5.000 granos de súlfuro de hidrógeno por 100 pies cúbicos, sale del tratamiento con menos de 1/10 de grano.

Después de purificado, el gas es de nuevo comprimido y despojado del gas natural y butano. Luego es deshidratado, antes de ser metido en el sistema de transmisión. Para la deshidrogenación se emplea una solución de aminas y glicoles.

El otro chorro de la planta purificadora es sometido a un procedimiento especial de recuperación de azufre. Los ensayos de la fábrica piloto muestran que puede recuperarse como el 80% del azufre y súlfuro de hidrógeno, en la forma de azufre. Al presente no se sabe qué forma e importancia se dará a la recuperación del azufre, según este procedimiento.

Cloracion electrica del agua salada para fines de disposición

Los explotadores de proyectos de disposición de agua salada sufrieron seria contrariedad cuando las prioridades exigidas por la guerra aumen-

A symbol of quality and service which now identifies in Latin America as well as in the United States the products marketed by the affiliated companies and distributors of the Standard Oil Company (N. J.)

WEST INDIA OIL COMPANIES
STANDARD OIL COMPANY OF BRAZIL

COMPAÑÍA DE PETROLEO LAGO
STANDARD OIL COMPANY OF CUBA

Un símbolo de calidad y de servicio que identifica en la América Latina lo mismo que en los Estados Unidos a los productos que tienen en venta las compañías afiliadas y distribuidores de la Standard Oil Company (N. J.)

LA urgencia de la producción de materiales de guerra hace que la técnica del gobierno de precisión sea un tópico de profundo interes para los ingenieros, dueños y administradores.

La creciente escasez de trabajadores idóneos, la necesidad de creciente rendimiento contínuo y las normas más exigentes que a menudo se encuentran en las especificaciones del gobierno, representan un triple problema para la industria.

Como resultado de lo antedicho, los dueños de empresas industriales están atiniéndose, cada día más y más, de los instrumentos de gobierno automático de precisión, para suprimir errores, reducir la carga de la supervigilancia y dejar los obreros más competentes en libertad pará atender a los trabajos más urgentes. Al mismo tiempo, los instrumentos de gobierno automático han, en muchos casos, facilitado la aceleración del régimen de producción, lo cual habría sido imposible con los metodos manuales ordinarios.

En vista de que existe abundante evidencia de que los instrumentos de gobierno automático, correctamente elegidos e instalados, constituyen la solución del triple problema industrial aludido más arriba, la Brown Instrument Company ha preparado un folleto de 64 páginas sobre el tema de "La técnica del gobierno de precisión en procedimientos industriales" (en inglés). Los ingenieros que han leido este nuevo folleto lo aclaman como una contribución importante y oportuna al esfuerzo de guerra—un documento completo sobre la instrumentación para el gobierno de precisión.

Este folleto tiene por objeto ayudar a los dueños y administradores a adquirir un conocimiento exacto de los principios fundamentales del gobierno automático y explicarles las mútiples aplicaciones de los sistemas automáticos de indicación, registro, regulación y señalización, para la medición y el gobierno de temperaturas, presiones, corrientes líquidas y niveles líquidos en diversos procedimientos industriales.

El contenido de este folleto incluye un análisis de los diferentes tipos de sistemas de instrumentos automáticos de gobierno y ejemplos especificos de tipicas aplicaciones de los mismos a las industrias de conversión, productos quimicos, acero, petróleo, cerámica, alimentos, acondicionamiento de aire y textiles. Los ejemplos han sido cuidadosamente elegidos, para mostrar métodos directamente adaptabales a muchas otras industrias, cubriendo así el completo campo de acción del gobierno automático de precisión de todas las actividades industriales.

Para obtener un ejemplar gratuito del folleto 80-1, cuyo título en inglés es "The Technique of Precision Control in Industrial Processes", sirvase escribir en su membrete a la Brown Instrument Company.

Para temperaturas . . . Presiones . . . Corrientes líquidas . . . Niveles líquidos

BROWN INSTRUMENTS

ELECTRIC • AIR OPERATED

THE BROWN INSTRUMENT COMPANY, 4488 WAYNE AVENUE, PHILADELPHIA, PENNSYLVANIA
DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR CO.
MINNEAPOLIS, MINNESOTA, AND 119 PETER STREET, TORONTO, CANADA
Wadsworth Road, Perivale, Middlesex, England — Nybrokajen 7, Stockholm, Sweden

are connected to a direct current generator.

The action of the electric current on the salt water produces around 15 lb. of chlorine per day which is ample for sterilization of the water. Some companies use motor generator sets to manufacture the necessary current and others use rectifying units for this purpose. From 5 to 7½ hp. has been found to be sufficient for manufacturing the necessary chlorine.

Repair of Casing Leaks

A left-hand thread, port-opening sub may be used for repairing casing leaks by scabbing a liner to the inside of the casing at the weak point. In this case, a duplex shoe is run on the bottom of the liner and a Texas shoe on the top. Cement is placed between the liner and the casing, and if need be, the braden head can be closed and cement forced into the formation. The tubing and annular space are then flushed out and the liner held in position until the cement is set. The tubing is then backed off by right-hand rotation.

Cleaning of Liner Perforations With Explosive Cord

A quick means of cleaning both slotted and round-hole perforations in liners was introduced during the past year. It consists principally of running an explosive cord inside the liner and then detonating it by means of an electrical current.

An added advantage of this method is that the perforations opposite the two or more zones can be cleaned with only one run of the equipment. The presence of fluid in the liner does not interfere with the explosive action but, as a matter of fact, helps it as the fluid transmits the pressure necessary to clean the openings.

The speed of detonation applies a sudden pressure to the fluid which forces it rapidly through the openings. At the fluid cannot move fast enough through the perforations, any material clogging them is pushed ahead. In the tests aboveground, the liner slots are restored to practically new condition.

The explosive cord is run in the well on a line which will carry an electrical current. The explosive cord is held in an extended position by a weight (shell filled with sand) on the bottom. If additional power is needed, two or more of these cords may be paralleled opposite the liner zone to be cleaned.

Production increases of from 100 to 150 per cent have been quite common when this practice of cleaning liners was used.

Storage of Liquid Hydrocarbons in Depleted Formations

Necessity of more storage space for products not finding a ready market led to considerable experimentation with the storage of liquid hydrocarbons in depleted producing formations. Butane has been the product which has been mentioned most often for this type storage, although there has been considerable thought given to the storage of gasoline, fuel and residual oils.

In one case, injection of the butane was started about 2 years ago when the gasoline plant in the field was producing more of this product than could be marketed. The butane was injected through the annular space between the tubing and casing. A year later, it was found that satisfactory recovery of the butane could be obtained by pumping the well. The well in this case is operated at 70 lb. per sq. in. pressure to insure the butane staying in the liquid condition.

Some difficulty was experienced with paraffin deposition at the start of pumping, but this was eliminated. The tubing was cleaned by injecting gas through the tubing for several days with the standing valve removed, the well producing the butane through the annulus. Standing valve, traveling valve and rods were then run and the well put to pumping.

So far none of these projects has been in operation long enough to determine efficiency of the recovery of the stored butane. It is believed that the underground losses will not be great and in some cases might actually exceed the input due to the flushing of residual oil left in place in the formation when original production was abandoned.

Power-Driven Pipe-Threading Machines

These devices were first introduced to the oil fields by pipe-line crews which used them extensively while connecting the gathering lines to the tank battery. They eliminate the necessity of hand threading, which requires the services of two men for a considerable length of time. The power-driven thread-cutting machine not only reduces the amount of manpower required but also permits the cutting of more threads.

Machines of this type are similar to the standard-model pipe threaders, but they are driven by a shaft from a power takeoff on a truck or tractor. One such arrangement has the shaft from the power takeoff projecting through the frame of the truck. Another has the shaft projecting from the rear between the frame and the truck bed. A third is attached to one of the rear wheels. Regardless of the position of the takeoff shaft, it is generally equipped with several universal joints so that strain will be eliminated.

Improved Packer Rubbers

Difficulty with the sticking of packer rubbers in wells has always been the source of considerable trouble. Manufacturers have been studying this problem and have

taron el precio del cloro y finalmente separaron a las compañías petroleras de sus fuentes de abastecimiento de este material. El cloro era necesario en los trabajos de disposición de agua salada para impedir la formación de bacteria reductora de súlfuro. Esta bacteria producía un cieno que podía tapar la zona de disposición en introducir presiones de inyección ascendentes.

En varios establecimientos se instaló un equipo electrolítico para fabricar el cloro necesario, utilizando agua salada. Una serie de placas de grafito, de más o menos 3½ pies por 6 pulgadas, por 1 pulgada de espesor, se coloca en tablas de madera, con separadores de baquelita. Las placas se conectan a un generador de corriente continua.

La acción de la corriente eléctrica sobre el agua salada produce como 15 libras de cloro al día, lo cual es amplio para la esterilización del agua. Algunas compañías usan motogeneradores para producir la corriente necesaria, y otras se valen de rectificadores para este fin. De 5 a 7½ cdf. es suficiente para producir el cloro necesario.

Reparación de escapes en la tubería

Un acoplador para unir herramientas, de rosca izquierda y abertura lateral, puede usarse para reparar escapes en la tubería, colocando un forro tubular en el interior de la tubería, en el punto debilitado. En este caso, el forro tubular lleva una zapata doble al fondo, y una zapata Texas al tope. El cemento se coloca entre el forro tubular y la tubería, y de ser necesario, podrá cerrarse la cabeza bradenhead, para inyectar cemento en la formación. La tubería y el espacio anular se limpian bien y el forro tubular se mantiene en posición hasta que se haya endurecido el cemento. La tubería es luego retrocedida por rotación a derecha.

Limpieza de perforaciones de tubería con cuerda explosiva

Un medio rápido de limpiar las perforaciones ranuradas o circulares de la tubería fué introducido el año pasado. Consiste principalmente en bajar una cuerda explosiva por el interior de la tubería, y luego hacerla detonar mediante una corriente eléctrica.

Una ventaja adicional de este método es que las perforaciones al frente de dos o más zonas pueden limpiarse con sólo una pasada del equipo. La presencia de líquido en la tubería no perturba la acción explosiva, sino que, en realidad, la ayuda, pues el líquido transmite la presión necesaria para limpiar las aberturas.

La rapidez de la detonación aplica una presión súbita al flúido, obligándolo a atravesar o pasar por las aberturas. Como el flúido no puede pasar con bastante rapidez por las perforaciones, cualquier material que las tape será empujado hacia adelante. En los ensayos sobre la superficie de la tierra, las ranuras de la tubería quedan restablecidas a condición casi nueva.

La cuerda explosiva se corre en el pozo con un cable que transmite una corriente eléctrica. La cuerda explosiva se mantiene en una posición extendida, por medio de un peso (casco lleno de arena) al fondo. De necesitarse fuerza adicional, dos o más de estas cuerdas podrán usarse en paralelo, al frente de la zona de la tubería por limpiarse.

Aumentos de producción de 100 a 150% han sido los resultados corrientes de la limpieza de la tubería según el nuevo procedimiento.

Almacenaje de hidrocarburos líquidos en formaciones agotadas

La necesidad de más espacio de almacenaje para productos de poca demanda actualmente, ha conducido a hacer experimentos con el almacenaje de hidrocarburos líquidos en formaciones productivas agotadas. El butano ha sido el producto que se ha mencionado, con mayor frecuencia, para este tipo de almacenaje, a pesar de que se ha dado mucho estudio al almacenaje de gasolina, petróleos combustibles y petróleos remanentes.

En un caso típico, se inició la inyección de butano hace como 2 años, cuando la instalación de gasolina en el yacimiento estaba produciendo más de este producto de lo que se podía entonces vender en el mercado. El butano fué inyectado por el espacio anular entre la tubería y el entubamiento. Un año después, se vió que se podía obtener una regeneración satisfactoria del butano extrayéndolo por bomba del pozo. En el presente caso, el pozo se sometió a una presión de 70 libras por pulgada cuadrada, para asegurar la retención del butano en condición líquida.

Se experimentó cierta dificultad con la acumulación de parafina al comienzo de la extracción, pero finalmente el problema fué resuelto. El entubamiento se limpió con gas de inyección durante varios días, y durante este tiempo se le quitó la válvula fija. El pozo produjo el butano por el anillo o corona. Después se instalaron la válvula fija, la válvula de émbolo y las varillas, para la extracción corriente por bomba.

Hasta ahora, ninguno de estos proyectos ha estado trabajando durante un tiempo suficiente para determinar exactamente el rendimiento de la regeneración del butano almacenado. Se cree que las pérdidas subterráneas no serán grandes y que en algunos casos podrán, en efecto, exceder lo recibido, debido al lavado del petróleo remanente en la formación o yacimiento al tiempo de abandonarse la producción original.

Máquinas de filetear tubo accionadas por motor

Estas máquinas fueron primeramente introducidas a la industria del petróleo por las empresas tendedo-

made substantial improvements. Impregnation of the rubber element with a lubricant which comes out under the heat and pressure encountered in the well prevents sticking.

Other improvements in this item of equipment insure a positive seal under greater pressure and ease of removal.

One new-type packer permits the tubing to be raised or lowered as desired. It automatically closes when the tubing is pulled from the well and any fluid above it is held in place. It has been used in two-zone production work and in wells where it is necessary to keep the annulus filled to prevent corrosion.

Removable Circulating Valve

The completion of high-pressure, multiple-producing-zone wells formerly required that the well be swabbed or circulated before the permanent connections were installed. The danger of such an operation is obvious as the well might unload before the control equipment could be put in place. The development of a new removable-type circulation valve makes this operation quite simple.

Formerly the packer was set, the tubing landed, the well swabbed or circulated and then the connections installed. A side-door choke would be run after the two zones had cleaned themselves. During this period, the zones would be open to each other and interzone communication possible.

The new automatic circulating valve is run above the packer. As long as circulation is maintained by pumping through the tubing, the ports remain open but as soon as the pumping is stopped, the ports close. The tool can be pulled or run under pressure and without breaking the seal of the packer. The procedure for running the circulating valve is the same as that for a side-door choke.

Multizone Production

Multiple-zone completion and operation of oil and gas wells has been the outstanding advance in production methods in the past 5 years. This technique is still in the development stage and further improvement will bring it to the point where it is as common as an ordinary single-zone completion. The necessary diversion of steel to the war effort has hastened the development of equipment needed in multizone completions.

The advantages and disadvantages of the method are obvious and have been discussed previously.

At the present time, dual wells generally fall into two classes: (1) Those in which both zones are pumped; and (2) those in which both zones are flowed. Generally in flowing wells the upper zone is produced through the annulus between the tubing and casing and the lower zone through the tubing; the zones are separated by a packer.

Where it is not necessary to separate the two zones in a pumping well, they are allowed to flow into the well bore and are picked up by the pump. Where legal restrictions of well conditions make it impossible to do this, a packer separates the two zones and production is obtained alternately from the two zones. The tubing is equipped with a flush-joint tail pipe which has perforations and the location of the perforations above or below the packer determines from which zone the pump picks up the oil.

Flexibility of the two-zone wells has been demonstrated. It is possible by using two strings of concentric tubing to gas-lift one zone and flow or pump the other. In some cases injection of gas for repressuring purposes has been carried on through one zone while producing the other zone. In some cases, two or more zones have been repressured successfully through a single well.

The producing of the multizone wells is not without its problems. The annular space may be partially filled with fine sand but this can be removed by high-velocity circulation through the side-door choke. If it becomes necessary to kill the well and remove the tubing and packer and rerun them, this can be done without danger of movement between the formations, providing the hole is kept full of oil.

Paraffin may be deposited both in the tubing and in the annulus. In the former case, the regular tubing knives, scrapers, etc., can be used to effect its removal. Generally, it is possible to predict the points of the worst paraffin deposition in the annulus and a side-door choke can be installed at this point. When there is evidence of stoppage, a blankoff is run below the side-door choke, the choke opened and solvent circulated to remove the paraffin.

As many of the two-zone wells are located in fields where it is necessary to take frequent bottom-hole-pressure tests, provisions must be made for obtaining such data. The lower zone test may be made by running the bomb through the tubing. The upper zone is tested by running a blankoff tool below the side-door choke and then opening the choke.

Considerable equipment has been designed and used in the multizone production so that now practically any problem can be met with equipment which is available. As more experience is gained in this type work, probably many new items will be developed to facilitate the production from such wells.

Bottom-Hole Choke for Pumping Wells

The use of a subsurface choke in pumping wells has been found helpful in reducing the amount of salt water produced with the oil. A packer between the tubing and casing causes all of the fluid coming from the formation to pass through the choke. A more uniform rate of

ras de oleoductos, las cuales las aprovecharon mucho para la conexión de las tuberías recolectoras a los tanques o depósitos. Eliminan la necesidad de filetear o roscar a mano, trabajo que exige los servicios de dos hombres por un considerable período de tiempo. La fileteadora de tubo, accionada por motor, reduce la cantidad de trabajo manual requerido y también, por otra parte, permite aumentar grandemente el rendimiento.

Las máquinas de este tipo son similares a las fileteadoras de tubo de modelo normal, pero reciben propulsión de un árbol unido al tomafuerza de un camión o tractor. En ciertos equipos, el árbol se proyecta del tomafuerza por detrás del bastidor del camión. En otros equipos, el árbol se proyecta por detrás, entre el bastidor y la base del camión. Hay también un modelo que se conecta a una de las ruedas traseras. Independientemente de la posición del árbol del tomafuerza, la transmisión comprende varias articulaciones universales para suprimir la tensión lo más que se pueda.

Empaquetaduras de caucho perfeccionadas

La dificultad provocada por la pegadura de las empaquetaduras de caucho en los pozos ha sido fuente de muchos inconvenientes. Los fabricantes han venido estudiando el problema y logrado introducir notables perfeccionamientos. La impregnación del elemento de caucho con un lubricante que se exuda bajo la temperatura y presión existentes en el pozo, evita la pegadura.

Otros refinamientos en esta clase de empaquetadura aseguran un cierre positivo bajo las presiones mayores y facilidad de salida.

Una empaquetadura de nuevo tipo permite la subida y la bajada del entubamiento al gusto del operario. Se cierra automaticamente, después de salido el entubamiento del pozo, y todo líquido encima de ella queda retenido en ese punto. Se ha usado en trabajo de producción de dos zonas y en pozos en que es necesario conservar lleno el anillo o corona para evitar la corrosión.

Producción multizonal

La terminación y explotación multizonal de pozos de petróleo y de gas ha sido el progreso más destacado en métodos de producción durante estos últimos 5 años. Esta técnica está todavía en su etapa de desarrollo y su adicional perfeccionamiento la llevará a un punto en que será tan comun como la terminación ordinaria de una sola zona. La necesaria desviación del acero a usos militares o de guerra ha acelerado el desarrollo de equipo utilizado en las terminaciones multizonales.

Las ventajas y desventajas del método son evidentes y han recibido amplia discusión.

Al presente, los pozos duales o dobles se clasifican generalmente en dos clases: (1) Aquellos en que la extracción desde ambas zonas se efectúa por bomba; y (2) aquellos en que la extracción desde ambas zonas se efectúa sin la ayuda de bomba. Por lo general, la producción de la zona superior, de los pozos brotantes, sale por el anillo o espacio anular entre el entubamiento y la tubería, y la producción de la zona inferior, por el entubamiento, quedando ambas zonas separadas por una empaquetadura.

Cuando no es necesario separar las dos zonas de un pozo de extracción por bomba, se deja que emanen dentro del interior del pozo, extrayéndose de acquí por la bomba. Donde las restricciones legales de las condiciones de pozo hacen imposible hacer esto, las dos zonas se separan por una empaquetadura, y la producción de ambas se obtiene de una manera alternada. El entubamiento se provee de un tubo de unión lisa perforado, y la posición de las perforaciones, arriba o debajo de la empaquetadura, determina de qué zona extraerá la bomba el petróleo.

La adaptación de los pozos de dos zonas ha sido ya demonstrada. Se hace posible usando dos cadenas de entubamiento concéntrico, la una para la extracción por gas de una zona, y la otra para la extracción expontánea o por bomba de la otra zona. En algunos casos, la inyección de gas, para los fines de aplicar presión, se ha llevado a efecto en una zona, mientras continúa la emanación o producción de la otra zona. En otros casos, dos o más zonas han recibido satisfactoria presión mediante un solo pozo.

La explotación de pozos de varias zonas no deja de presentar también sus problemas. El espacio anular podrá estar parcialmente tapado con arena fina, pero puede quitarse este obtáculo por la circulación a alta velocidad, a través del estrangulador lateral. Si fuera necesario paralizar el pozo, para quitarle el entubamiento y empaquetadura, para usarlos de nuevo, esto puede hacerse sin peligro de movimiento entre las formaciones, siempre que el pozo quede lleno de petróleo.

La parafina podrá acumularse tanto en el entubamiento como en el espacio anular o anillo. En el primer caso, los raspadores y otras herramientas limpiadoras servirán para su remoción. Generalmente, es posible predecir los puntos de mayor acumulación de parafina en el espacio anular, y la colocación en tales sitios, de un estrangulador de puerta lateral resuelve el problema. Cuando hay evidencia de paralización, se corre un obturador liso debajo del estrangulador, se abre este último para dar paso al disolvente que quita la parafina.

Como muchos de los pozos de dos zonas están situados en yacimientos donde es necesario hacer frequentes mediciones de presión de fondo, hay, por supuesto, que proveer medios para obtener esta información. El ensayo de la zona inferior podrá hacerse bajando la bomba por el entubamiento. La zona superior se

McCORD LUBRICATORS
Standard Lubricators of the Oil Field

McCORD "SP" LUBRICATOR
FOR SLUSH PUMPS AND DRILLING ENGINES

The "SP" Lubricator is a development over a period of years to meet the demand for a strong rugged type of lubricator that would withstand vibration and continue to deliver uninterrupted service. The design and workmanship are of the highest type, working tolerances are extremely close, making the "SP" a most accurate and dependable lubricator. This lubricator will stand up under extreme conditions encountered in this service and continue to deliver uninterrupted service.

Features are: Removable pump units. Flexible oil delivery. Large clear sight feeds. Large capacity auxiliary reservoir tank.

Built to handle the heavy grades of oil, this lubricator is standard on Ajax steam drilling engines, National slush pumps, and Gardner-Denver drilling engines and slush pumps.

THE McCORD "LD" LUBRICATOR
DEPENDABLE—ACCESSIBLE—ECONOMICAL

The McCord Class "LD" Lubricator is the only one of the two plunger sight feed types that shows the oil is actually being delivered to the cylinder or part being lubricated. This is an exclusive McCord Safety feature which definitely shows at all times the lubricator is functioning properly. In the McCord Class "LD" after the oil has passed through the sight feed glass, undetected leakage is impossible, an additional safeguard that makes for dependable service.

Pump units can be adjusted to deliver varying quantities of oil from a fraction of a drop to a constant stream, and at any and all speeds. The same quantity of oil is delivered when using a light oil as when using a heavy cylinder oil. Every McCord pump unit is tested against 2000 pounds pressure.

Reservoir capacities 1 qt. to 4 gal. Feeds 1 to 24—30 Standard sizes.

Catalog and Price List on Request.

McCORD CLASS "SF" LIQUID SIGHT FEED LUBRICATOR

1. *Positive Oil Delivery at all Times.*
McCord Class "SF" Lubricators have been designed to deliver oil at frequent and regular intervals, in a predetermined charge sufficiently large to maintain the oil film on moving surfaces.
2. *Rugged Pump Construction.*
McCord pump units are simple, sturdy and accurate, positive in operation and independently mounted. McCord pump units are the most accurate and efficient known.
3. *Flexibility of Oil Delivery.*
McCord Class "SF" Mechanical Lubricators have the most flexible and accurate oil delivery known. It is not necessary to disassemble any part of a McCord Class "SF" lubricator in order to make adjustments.
4. *Removable Pump Units.*
Any pump unit may be removed on the McCord Class "SF" Lubricator without stopping the lubricator, nor in any way interfering with its operation.
5. *Adaptability to Source of Power.*
Eighteen types of drive are provided on the McCord Class "SF". A McCord Class "SF" Lubricator may be placed anywhere, either directly on the machine or remote from it, according to the requirements of the job.
6. *Taper Nozzle Gives Accurate Oil Delivery.*
The size of the oil drop leaving the tapered sight-feed nozzle is approximately one gravity drop, the universal standard for measuring lubricants. The nozzle is readily removable giving access to the sight feed check ball.

THE McCORD TYPE "C" CHEMICAL MEASURING PUMP

The design of this McCord pump incorporates these important features:

(1) The ability to deliver a predetermined amount of liquid, proportioned according to the requirements, over a definite period of time, or a measured quantity, according to speed of the operating machine.
(2) Second only to accuracy is dependability and all units of the McCord pump are designed with long life and durability—an important consideration.
(3) Individual removable pump units make for easy adjustment, for quick removal for cleaning.
(4) All working parts are completely enclosed, operating in oil, fully protected from dust, dirt and the elements.
(5) The McCord design insures positive delivery of liquids even against pressure as high as 2,000 lbs.
(6) McCord engineering is further evident in the fact that the driving mechanism can be readily removed by taking out four bolts, providing it is desired to change to rotary or ratchet drive.

Accuracy of delivery is possible because of the finely engineered design with a minimum number of parts, carefully machined to McCord's close standards. All working parts are enclosed, fully protected from dust, dirt and the elements.

When used for the delivery or injection of chemicals into crude oil lines an auxiliary chemical tank, made of terneplate, of three-gallon capacity is provided. This tank is connected to the suction side of the pump. For this service pump units, made of steel, are used. (Pump units made of other alloys can be supplied.)

CAPACITY

The ½-inch plunger model delivers one pint of liquid in 261 plunger movements. The ⅜-inch plunger model delivers one pint of liquid in 464 plunger movements, while the ¼-inch plunger model delivers one pint in 167 plunger movements. Catalog on request.

LUBRICADOR McCORD "SP" PARA BOMBAS DE LODO Y MAQUINAS DE PERFORAR

El lubricador "SP" es el resultado de muchos años de experiencia en la fabricación de lubricadores capaces de satisfacer la demanda de modelos bien firmes para resistir la vibración y seguros para dar un servicio continuo, sin interrupción. En tipo y construcción, estos lubricadores son de primer orden. Debido a sus limitados tolerancias de trabajo, los modelos "SP" son muy exactos y seguros. Se prestan al servició más exigente y tienen una duración efectiva verdaderamente extraordinaria.

Sus rasgos principales son: Grupos de bombas separables. Entrega de aceite regulable. Alimentaciones visibles grandes y claras. Depósito auxiliar de gran capacidad.

Construcción adaptada al manejo de los aceites más pesados. El presente modelo es dotación normal en las máquinas perforadores de vapor Ajax, bombas National para lodo y máquinas de perforar y bombas de lodo de marca Gardner-Denver.

EL LUBRICADOR McCORD "LD" SEGURO — ACCESIBLE— ECONOMIO

El lubricador McCord, de clase "LD" es el único tipo de alimentación visible, de dos émbolos, que permite seguir con la vista la gota de aceita hasta que lleva al punto del cilindro o de cualquier otra parte, que ha de recibirla para su lubrección. Esto constituye un rasgo de seguridad exclusivo del lubricador McCord, que permite asegurarse, en cualquier momento, de que el lubricador está funcionando bien. En el lubricador McCord, después de que el aceite ha pasado por el vidrio de alimentación visible, el escape nunca puede pasar sin ser observado, lo que esuna adicional ventaja de seguridad de correcto servicio.

Capacidades del recipiente, de 1 cuarto de galón a 4 galones. Alimentaciones de 1 a 24-30 de tamaños normales.

A solicitud enviaremos catálogo y lista de precios.

LUBRICADOR LIQUIDO McCORD DE CLASE "SF" DE ALIMENTACION VISIBLE

1. *Alimentación positiva de aceite en todo momento.*
Los lubricadores McCord de clase "SF" han sido proyectados especialmente para alimentar aceite a intervalos regulares y frecuentes, con una carga determinada de antemano bastante grande para mantener una película de aceite sobre las superficies en movimiento.
2. *Bombas de construcción bien firme.*
Los grupos de bombas McCord son sencillos, firmes y precisos, de funcionamiento positivo y de montaje independiente. Los grupos de bombas McCord son los más eficaces del mercado.
3. *Flexibilidad de la alimentación de aceite.*
Los lubricadores mecánicos McCord de clase "SF" tienen la alimentación de aceite más flexible y más precisa que se conoce en la industria. No hay necesidad de desmontar ninguna pieza del lubricador McCord de clase "SF" para efectuar su regulación.
4. *Grupos de bombas amovibles.*
Del lubricador McCord de clase "SF" se puede desmontar cualquier grupo de bomba sin tener que parar el lubricador o sin que esto separación afecte de alguna manera su buen funcionamiento.
5. *Adaptabilidad a la fuente de fuerza motriz.*
Para los lubricadores McCord de clase "SF" se han provisto diez y ocho tipos de propulsión o mando. El lubricador McCord de clase "SF" puede instalarse en cualquier punto, ya sobre la misma máquina, ya a distancia de ella, según las condiciones del trabajo que se presente.
6. *Boquilla cónica para asegurar una precisa alimentación.*
El tamaño de la gota de aceite que cae de la boquilla cónica de alimentación visible es alrededor de una gota de gravedad, que es la medida universal para los lubricantes. La boquilla o surtidor puede desmontarse con facilidad, permitiendo inmediato acceso a la válvula esferica de retención de la alimentación visible.

LA BOMBA DE DOSIFICACION QUIMICA McCORD DE TIPO "C"

La construcción de esta bomba McCord comprende las importantes características siguientes:

(1) La facultad de alimentar una cantidad fijada de antemano de liquido, dosificada según las necesidades del caso, durante unperíodo dado de tiempo, o una cantidad regulada de acuerdo con la velocidad de la máquina en marcha.
(2) A continuación de la precisión viene la seguridad. Todas las piezas de la bomba McCord se hacen de modo que rindan mucho tiempo de servicio práctico, lo que es un elemento esencial.
(3) El fácil desmontaje de todas las pieza de la bomba McCord permite un ajuste rápido y preciso y una limpieza completa.
(4) Todas las piezas móviles están completamente encerradas, funcionando en aceite, completamente protegidas contra el polvo, tierra y los elementos naturales.
(5) La construcción McCord asegura una alimentación positiva de liquidos, aun en presencia de presiones hasta de 2.000 libras.
(6) La superioridad técnica de la bomba McCord se pone una vez más de evidencia mediante el hecho de que el mecanismo de propulsión puede extraerse con facilidad quitando sencillamente cuatro pernos, en el caso en que se desee pasar a propulsión rotativa o de trinquete.

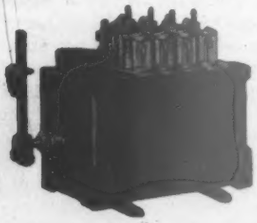
Cunado se emplean estas bombas para alimentar o inyectar productos químicos en los conductos de petróleo crudo, se proveen de un depósito químico auxiliar, de lámina con revestimiento de plomo, con cabida para tres galones. Este depósito se une al lado de aspiración de la bomba. Para este servicio se emplean bombas de acero. (También podemos suministrar unidades de bombas de especiales aleaciones de acero.)

CAPACIDAD

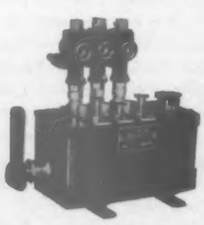
El modelo de émbolo de ½ pulgada alimenta una pinta (como un litro) de líquido en 261 movimientos de émbolo. El modelo de ⅜ de pulgada alimenta una pinta de liquido en 464 movimientos de embolo, y el modelo de ¼ de pulgada alimenta una pinta en 167 movimientos de émbolo. Catálogo a solicitud.

Other McCord Products: Metallic Asbestos Gaskets; Engine Cooling Radiators; Unit Heaters.

"SP" Lubricator for slush pumps



4 Feed "LD" Lubricator



"SF" Lubricator

Chemical Measuring Pump

McCORD RADIATOR & MFG. CO., DETROIT, U.S.A.

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Nelson Liners are the SURE means to INCREASED PRODUCTION and DECREASED WELL MAINTENANCE COSTS wherever sand is a problem. Stop worrying about the expense and troubles of sand production. Install NELSON Pre-Packed Gravel Liners. They stop practically all pulling and bailing, bring old wells to life and have many other advantages which save money. Send for your copy today of booklet with full information.

Los forros Nelson son el medio SEGURO de AUMENTAR LA PRODUCCION y REDUCIR LOS GASTOS DE CONSERVACION DEL POZO, en todo caso en que la arena es un problema. No se preocupe más del gasto y molestia de la producción de arena. Instale los forros de grava pre-empacados de NELSON. Paran casi toda sacada y limpieza y dan nueva vida a los pozos viejos. Tienen muchas otras ventajas que ahorran gastos. Pídanos ejemplar de nuestro folleto descriptivo.

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3035 CHERRY AVENUE,
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CALIFORNIA,
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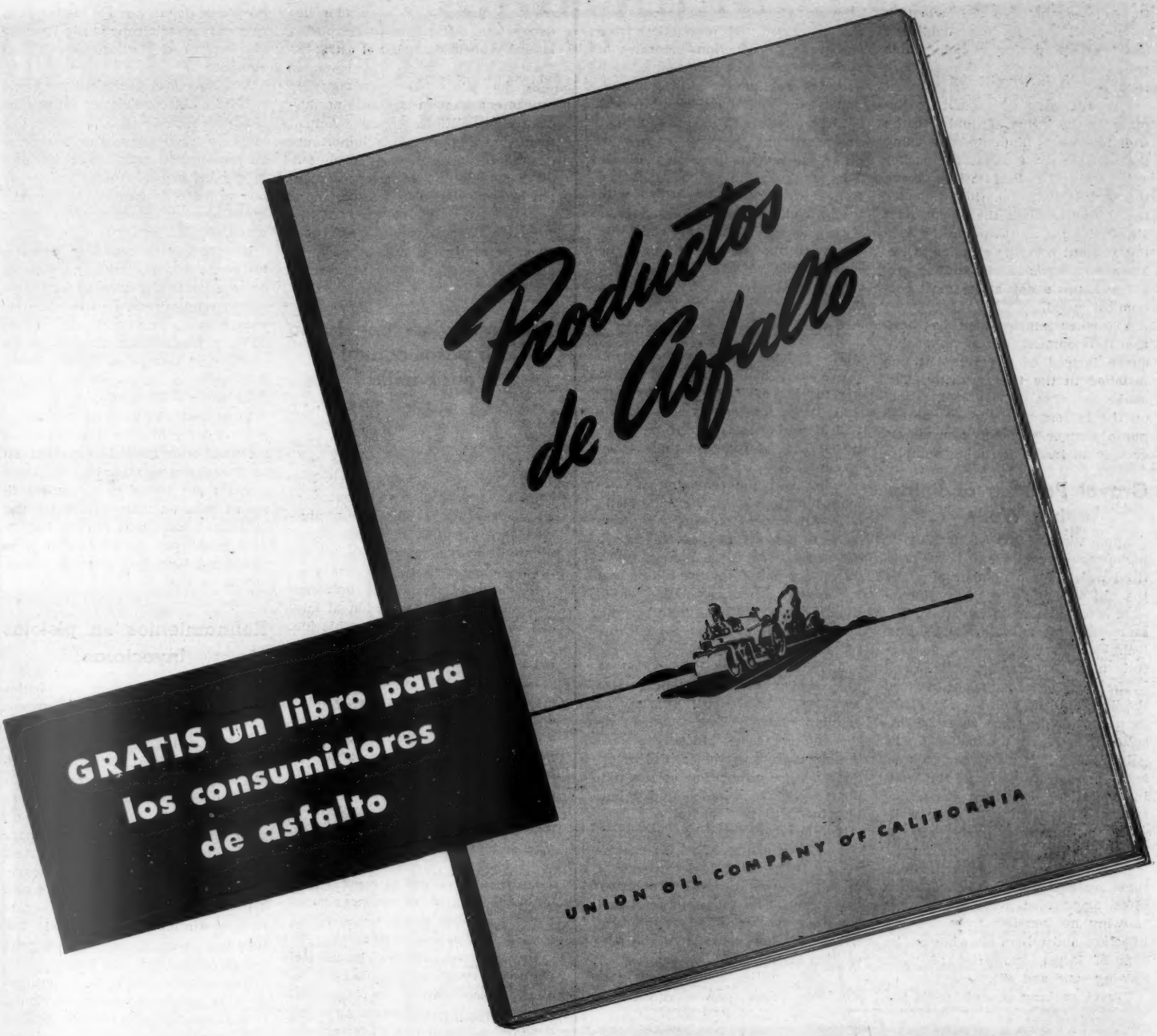

Acaba de publicarse! La última información sobre especificaciones y requisitos acerca de asfalto . . . cómo usarlo efectiva y económicamente. Pida usted hoy mismo un ejemplar gratis de "Productos de Asfalto", publicado por la Union Oil Company of California, en el que se le dice:

Cómo Construir Carreteras Asfaltadas! "Productos de Asfalto" le indica a usted exactamente cómo construir carreteras, calzadas para automóvil, plazoletas, canchas de tennis, etc. Le demuestra la forma de construir caminos para cualquier volumen de peso o tráfico y cómo se puede hacer a un costo mucho menor que con cualquiera otro tipo de pavimento.

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Más aun, especifica las cantidades de asfalto que se necesitan para lo siguiente: TRAZO DE SEPULCROS • AISLAMIENTO ELECTRICO • PISOS • PINTURAS ASFALTADAS • IMPERMEABILIZACION DE PAPEL TAPIZ • REMIENDO DE TECHOS.

UNION OIL COMPANY OF CALIFORNIA

Si usted usa en alguna forma el asfalto, escriba a la Union Oil Company, Drawer A, Balboa, Canal Zone, pidiendo un ejemplar gratuito de "Productos de Asfalto". O bien, escriba a la Union Oil Company of California, 617 West 7th St., Los Angeles, California, U. S. A.

fluid movement from the formation to the well bore is thus established and periods during which water could be pulled into the well bore reduced.

The difficulty of regulating the pump to the influx of fluid into the well has been eliminated by using the annular space above the packer as a reservoir. Perforations above the packer allow the fluid to enter the tubing through the choke, pass above the packer through the tubing and out into the annular space. The pump needs to be operated only a few hours a day at its most economical speed.

A further improvement has been the development of a removable choke instead of a permanent one installed in the tubing string. The choke is removed by a pickup tool on the bottom of the pump or the pump plunger, depending on whether it is an insert or tubing pump.

Gravel Packing of Pumping Wells

Application of gravel packing to high-pressure wells has been practiced widely for a number of years. the object being the prevention of sand accumulation in the wells. The same principle and almost the same technique have also been successfully used on pumping wells.

The plugging of the space between the liner and the well bore by shale, sand and silt in some cases has resulted in reducing production to the point where it is no longer economically possible to continue the wells in operation. In other cases, the sand and silt coming into the wells score the pumps so badly that frequent pulling jobs are necessary.

Where fields having such conditions are repressured, the trouble is often aggravated with some wells showing no benefits from the gas injection and others showing an influx of larger quantities of mud, flowing sand and silt.

Gravel packing of such wells has eliminated much of the trouble and has increased the production from the wells. Production increases of over 200 per cent and elimination of the down time for pulling and repairing the wells have been effected.

The procedure is to pull the liner and clean out the well by any or all of the several common methods. The cavity in the producing formation is then completely filled with pea gravel, a new perforated liner with closed bottom is run into the well and driven through the gravel. The well is then put back on production.

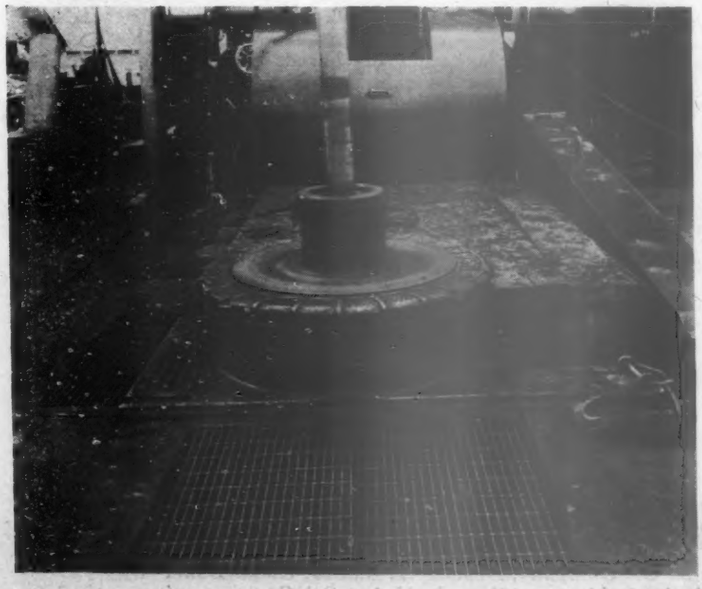
Jet Gun Improvements

There have been numerous improvements in acidizing and acidizing technique. There are now several types of jet guns available which can be used for different purposes. One of these has all of the openings directed downward, and it can be used for removing the cement plug in a well. The same method has been used for deepening lime wells to a lower pay. Some experimentation was carried on with a bit on the bottom of the tubing and using acid for a circulation fluid. The method worked out all right, but the lower pay was not encountered.

A foot valve has been added to the regular jet gun which is also provided with lateral, vertical or angular jets. The foot valve allows the tubing to be unloaded before pulling it from the hole; it also permits reverse circulation as the tubing merely has to be lowered to bottom to open the foot valve.

Another type gun has a removable screen assembly which can be pulled from the hole by means of a socket run on a sand line or measuring line. The jet gun barrel and the bottom perforated nipple are left in the hole as part of the production string.

A fully retractable gun is also available. This gun is run inside



Grill work on the derrick floor allows mud to escape and prevents slipping

Tipo de piso de la torre que permite lodo a escapar y prevenir accidentes

ensaya colocando un obturador liso debajo del estrangulador de puerta lateral y abriendo luego el estrangulador.

Se ha proyectado y construido mucho equipo para uso en la producción de múltiples zonas. Actualmente no hay problema importante que no pueda resolverse con el equipo disponible. A medida que aumenten los conocimientos y experiencia, en lo tocante a esta clase de trabajo, se perfeccionaran seguramente muchas herramientas nuevas para facilitar la producción de semejantes pozos.

Estrangulador de fondo para pozos actuados por bomba

El uso de un estrangulador o reductor subterráneo en los pozos de extracción or bomba ha resultado útil en reducir la cantidad de agua salada que sale con el petróleo. Una empaquetadura dispuesto entre el entubamiento y la tubería de producción hace que todo el líquido proveniente de la formación o yacimiento pase por el estrangulador. Un régimen de movimiento más uniforme del líquido, de la formación al interior del pozo, queda así establecido, y los períodos de penetración de agua en el pozo se reducen mucho.

La dificultad de regular la bomba de acuerdo con la entrada del líquido en el pozo ha sido suprimida mediante el uso del espacio anular arriba de la empaquetadura, como un depósito. Las perforaciones arriba de la empaquetadura permiten que el líquido entre al entubamiento a través del estrangulador o reductor, pase por arriba de la empaquetadura, luego por el entubamiento y salga finalmente por el espacio anular. La bomba podrá entonces accionarse sólo unas pocas horas al diá, a su velocidad más económica.

Un adicional progreso ha sido el desarrollo de un estrangulador o reductor desprendible, en lugar del permanente que se instala en la cadena de entubamiento. El estrangulador se quita por una herramienta de levantamiento colocada al fondo de la bomba o del émbolo de la bomba, dependiendo de si es una bomba de inserción o de tubo.

Empaque de grava de pozos actuados por bomba

La aplicación de empaque de grava a pozos de alta presión ha sido practicada extensamente desde hace años, con el objeto de evitar la acumulación de arena en el pozo. El mismo principio y casi la misma técnica se han aplicado también, con éxito, a los pozos accionados por bomba.

La obturación del espacio entre el ferro tubular y el interior del pozo, por esquisto, arena y sedimento, resulta, en algunos casos, en reducir la producción hasta el punto de paralizar el trabajo por lo costoso de su explotación. En otros casos, la arena y sedimentos, que entran en los pozos, dañan tanto a las bombas, que es necesario repetir con frecuencia los trabajos de reparación del equipo.

En aquellos yacimientos donde existen estas condiciones y se someten a presión, la falta, a menudo se empeora, pues algunos de los pozos no muestran ningún beneficio de la inyección de gas, y otros presentan, por su parte, la entrada de mayores cantidades de lodo, arena flotante y sedimento.

El empaque de grava de semejantes pozos ha suprimido gran parte de esta falta, y servido para aumentar su rendimiento. Se han obtenido aumentos de producción de más de 200% y también, la eliminación de pérdida de tiempo en la extracción del equipo y reparación de las herramientas y el pozo.

El procedimiento es quitar el forro tubular y limpiar el pozo por los métodos ordinarios. La cavidad en la formación productiva se llena después por completo con grava fina, se baja un nuevo forro tubular perforado, con fondo tapado, haciéndolo pasar por la grava. El pozo queda así listo para ponerse a funcionar de nuevo.

Refinamientos en pistolas inyectoras

En la acidificación y su técnica se presentan numerosos progresos. Disponibles hay ahora varios tipos de pistolas inyectoras adaptados a diferentes trabajos. Uno de ellos tiene todas las aberturas dirigidas hacia abajo y puede emplearse para quitar el tapón de cemento de un pozo. Igual método se ha usado para profundizar pozos de cal a una zona inferior productiva. Se hizo un experimento con una barrena al fondo del entubamiento y usando ácido para la circulación. El método trabajó bien, pero no se encontró zona o capa productiva más baja.

Una válvula de pie se ha agregado a la pistola inyectora corriente, la cual está provista también de chorros laterales, verticales y angulares. La válvula de pie permite la descarga del entubamiento antes de quitarse del agujero; también permite la circulación invertida, pues sencillamente con la bajada del entubamiento hasta el fondo se abre la válvula de pie.

Otro tipo de pistola tiene una rejilla desprendible, la cual puede sacarse del agujero por medio de un manguito corrido en un cable de bomba de arena o cable de medición. El cilindro de la pistola de inyección y el niple perforado del fondo se dejan en el agujero, como parte de la cadena de producción.

También hay una pistola retractable. Esta pistola se corre por dentro del entubamiento, con un acoplador de varilla de bomba en el extremo superior, para ser levantado por una varilla de bomba. Se usa generalmente para perforar a mayor profundidad y es una herramienta de utilidad muy satisfactoria.

La práctica corriente es usar ácido para la remoción de depósitos

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for Well Surveys

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EL SURWEL
CLINOGRAFO GIROSCOPICO

Registra automaticamente la dirección e inclinación de los pozos a cualquiera profundidad. Presenta un cuadro completo y exacto del progreso de la perforación y correcta posición del agujero a cualquiera profundidad. Rápido, exacto, seguro y de verificación automática. Capacidad, hasta 2000 registros. Completamente protegido por patentes.

El clinógrafo SYFO

Mide la inclinación por medio de un nivel líquido. Los registros se hacen en unos pocos segundos y se obtienen inmediatamente a la llegada del instrumento a la superficie. Exacto, de verificación automática y económico en precio. Se usa en cable de alambre a como "go-devil". Patentado.

METODO DE REMOCION DE SONDA K-K

Un nuevo método de quitar la sonda exploradora usada en la perforación direccional después de perforar aproximadamente 20 piés de agujero de desvío lateral.

METODO DE ORIENTACION MAGNETICO

Un método rápido, exacto y de verificación automática, desarrollado para asegurar la correcta orientación de las herramientas deflectoras al fondo de un agujero. *Exacto hasta dentro de un medio grado, rápido* pues no se requiere ninguna orientación de vástago de perforación. *El trabajo lo hace un hombre solo desde el piso del aparejo de perforación.*

EL NUEVO E-C
(INCLINOMETRO ELECTROQUIMICO)

Un progreso verdaderamente notable en registro de desviación de agujero. Funciona con pilas secas, sobre establecidos principios electroquímicos. De verifación automática. Económico en precio de arriendo y costo de funcionamiento.

No se requiere ningún dispositivo cronométrico. Funciona con cable ordinario de medición. Fácil registro múltiple, con registros permanentes a inmediata disposición.

INDICADOR DIRECCIONAL MAGNETICO H-K

Registra la inclinación y dirección fotograficamente en discos de papel. Se usa en agujeros a descubierto o en tubería de perforación, con cañón de sacanúcleo de cable de alambre. Tiene soporte flotante de brújula y anillo de filamento cruzado en soporte triangular y unidades de inclinación intercambiables. Exacto y de verificación automáticas. Arriendo diario a precio racional. Completamente patentado.

SERVICIO DE ORIENTACION POLAR DE NUCLEOS

Rápido, económico y sin tiempo de perforación perdido. Los núcleos o muestras pueden elegirse a mano y enviarse de cualquiera distancia.

Consiste en determinar la orientación original en el terreno donde se sacan los núcleos durante la perforación y después de que las muestras se han traido a la superficie, identificando, por la polaridad magnética residual en los minerales pesados de la roca, los polos sur y norte del núcleo.

Los servicios se ofrecen a tarifas convenientes a los productores y contratistas de perforación, que prefieren registros hechos por ingenieros especialistas en esta clase de trabajo.

The SURWEL
GYROSCOPIC CLINOGRAPH

Records automatically direction and inclination of wells at any depth. Affords a true picture of drilling progress and correct location of the hole at any depth. Speedy, accurate, reliable and self-checking — capacity up to 2,000 records. Fully covered by patents.

The SYFO Clinograph

Measures inclination by a liquid level. Records made in a few seconds and immediately available upon instrument reaching surface. Accurate, self-checking and inexpensive. Used on wire line, or as "Go-Devil". Fully patented.

K-K WHIPSTOCK REMOVAL SUB AND METHOD

A new method of removing a whipstock used in directional drilling after approximately twenty feet of side-tracking hole has been made.

MAGNETIC METHOD OF ORIENTATION

A fast, accurate, self-checking method developed to assure correct orientation of deflecting tools at the bottom of the hole.

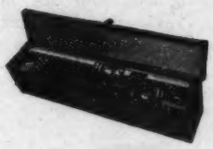
Accurate to within one-half of a degree (½°), speedy, as no drill stem orientation is required, *and the operation is done by one man on the derrick floor.*

The NEW E-C
(ELECTRO-CHEMICAL) INCLINOMETER

A truly great advance in recording hole deviation. Operated by dry cell batteries on sound electro-chemical principles. Self-checking. Low in rental charge and operating cost.

No timing device needed. Minimum recording time. Operates on ordinary measuring line. Multiple recording is easy—with permanent records instantly available.

The H-K
DIRECTIONAL MAGNETIC SINGLE SHOT



Records inclination and direction photographically on single paper discs. Used in open holes or in drill pipe, with non-magnetic sub or wire line core barrel. Has buoyant compass support and triangularly supported crosshair ring and interchangeable Inclination Units. Accurate and self-checking. Reasonable daily rates. Fully patented.

POLAR CORE ORIENTATION SERVICE

Rapid. Inexpensive. No drilling time lost. Cores can be hand-picked and shipped from any distance.

Consists of determining the original orientation in the ground of cores obtained during drilling and after the core samples have been brought to the surface, by identifying through residual magnetic polarity in the heavy minerals of the rock, the North and South sides of the core.

Services rendered at reasonable rates to producers and drilling contractors who prefer records made by engineers trained for this service.

SPERRY-SUN WELL SURVEYING CO. 1608 WALNUT ST., PHILA., PA.

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the tubing with a sucker-rod stub at the upper end so that it may be picked up with a rod socket. It is commonly used for drilling deeper and is a good all-purpose tool.

Common practice is to use acid for the removal of gyp and paraffin deposits in producing wells, and jet guns play an important role in the work.

Controlled Placement of Acid With an Electric Pilot

It has long been recognized that considerable advantage could be gained by the selective acidization of formations. Under the present controlled rates of production, it is possible to effect more equitable drainage if the tighter zones in a limestone pay are acidized while the more permeable streaks are left unaffected. This would tend to hold back production from the porous streaks, and the oil can be obtained from the zones where fluid movement is impeded. Such a procedure would not only result in an elimination of a period of large initial flush production but would also postpone and shorten the stripper period of the well. Another important factor is the loss of acid into a barren section. By placing the acid in the desired zone, the efficiency of an acidizing operation can be increased.

Previously the carrying out of such a plan has been very difficult because there was no way of telling into which portion of the formation the acid was entering. The use of a new tool, the electric pilot, now allows greater control while acidizing. It permits the introduction of the acid into the desired portions of the pay formations while preventing the acid from entering the undesirable pay section.

The tool is run on the bottom end of the tubing string, and an electric meter at the surface indicates whether the pilot is immersed in acid or oil. The electrical hookup of the pilot is such that an electrical circuit is completed when the pilot is immersed in a conductive fluid, such as acid, but the electric circuit is not completed when it is immersed in a nonconductive fluid, such as oil.

In making treatments using the electric pilot, it is the general practice to pump acid down the tubing and simultaneously pump oil down the casing. By varying the acid and oil pumping rate, it is possible to maintain the level of the top of the acid at any desired point in the well. As the pilot has previously been placed in the well at the point where it is desired to maintain the top of the acid, the reading on the electrical instruments at the surface will immediately tell where the top of the acid is and the respective pumping rates of the acid and oil can be adjusted in order that the acid level will be at the desired point.

Colocacion regulada de acido con un piloto eléctrico

Desde hace tiempo se sabe que se obtendría una gran ventaja mediante la acidificación selectiva de las formaciones. Bajo las presentes normas reguladas de producción, es posible efectuar un desagüe más equitativo si las zonas más apretadas en un yacimiento calcáreo se acidifican mientras las capas más permeables se dejan sin tocar. Esto tendería a retener la producción de las capas porosas, y el petróleo puede entonces obtenerse de las zonas donde está impedido el movimiento líquido. Semejante procedimiento resultaría no sólo en suprimir un período de gran producción inicial por inyección, sino también en postergar y acortar el período de producción limitada del pozo. Otro importante factor es la pérdida de ácido en una sección estéril. Colocando el ácido en las zonas deseadas, el rendimiento de una obra de acidificación puede aumentarse mucho.

Hasta hace poco, la ejecución de semejante plan ha sido muy difícil, a causa de que no había manera alguna de saber en qué porción de la formación estaba entrando el ácido. El uso de una nueva herramienta, el piloto eléctrico, permite ahora una mayor y mejor regulación de la aplicación de ácido. Permite la introducción del ácido en las porciones deseadas de la formación productiva, y al mismo tiempo impide que el ácido entre en la sección productiva que no se desea tocar.

La herramienta se coloca al fondo de la cadena de entubamiento, y un indicador eléctrico, en la superficie, acusa si el piloto está sumergido en ácido o en petróleo. La conexión elétrica del piloto está dispuesta de modo que se completa un circuito eléctrico sólo cuando el piloto está sumergido en un líquido conductivo, como es el ácido, y deja de completarse cuando está sumergido en un líquido no conductivo, como es el petróleo.

Al hacer tratamientos usando el piloto eléctrico, la práctica general es inyectar ácido por el entubamiento y simultaneamente inyectar petróleo por la tubería de producción. Variando la cantidad de ácido y de petróleo, que se inyecta, es posible mantener el nivel del ácido a cualquier punto deseado en el pozo. Como el piloto ha sido previamente colocado en la pared, en el punto donde se desea mantener el nivel superior del ácido, la acusación en los instrumentos eléctricos en la superficie indicarán inmediatamente donde se encuentra ese nivel, y en vista de esta indicación se regulan los régimenes de inyección de ácido y de petróleo, para conservar el nivel del ácido al punto deseado.

Progress in Exploration

THE progress made during recent years in closer collaboration between geological and geophysical departments has tended to overcome the lack of development of new methods during the period. The fact is, of course, that exploration is based on well-known geological and physical principles and new ones are hardly to be expected. However, continuous research is being carried on throughout the United States in an attempt to further the use of each field in both sciences as well as to combine different phases of exploration technique so as to permit more accurate predictions concerning the subsurface.

The history of many techniques is that an invention is made and tried experimentally—often with great success, followed by practical applications which frequently meet with less success. This is often due to imperfections in the technique, but more frequently to the fact that a method is applied universally when it is best adapted to a single region. Disappointment may thus lead to a premature abandonment of the method when, as a matter of fact, it might prove quite successful under many conditions. This has been true of the electrical and magnetic methods of exploration. It was also true of geochemical prospecting.

Of the three methods which are now little used, there is evidence of a revival in magnetic and electrical prospecting methods. The reflection seismograph and gravimeter remain far in front of all other geophysical methods and more parties have been operating during the past year than at any time in the recent past. This is due to the pressing need for discoveries.

Electrical Methods

A resistivity method of prospecting as well as correlating subsurface formations has been described using

Progreso en Exploracion

EL progreso realizado estos últimos años, en colaboración más íntima entre los departamentos geológicos y geofísicos, a tendido a sobreponerse a la falta de desarrollo de métodos nuevos durante este período. El hecho es, por supuesto, que la exploración se basa sobre principios geológicos y geofísicos bien conocidos y no se anticipan innovaciones en este sentido. Sin embargo, se prosigue un estudio prolijo en todo el país, para adelantar más el uso de cada campo en ambas ciencias, lo mismo que para combinar diferentes fases de la técnica de la exploración, a fin de lograr predicciones más exactas sobre las formaciones subterráneas.

La historia de muchas técnicas es que el invento descubierto se somete a experimentos, a menudo con gran éxito, seguidos por aplicaciones prácticas que no tienen tanto éxito. Esto se debe, generalmente, a imperfecciones en la técnica, pero con mayor frecuencia todavía, al hecho de que el método se aplica universalmente, cuando en realidad, se adapta mejor a una sola región. La falta de satisfactorios resultados puede así conducir al abandono prematuro del método, cuando, en realidad, podría resultar muy conveniente al ser sometido a trabajo bajo otras condiciones. Esto ha pasado con los métodos eléctricos y magnéticos de exploración. También sucedió lo mismo con los métodos de exploración geoquímica.

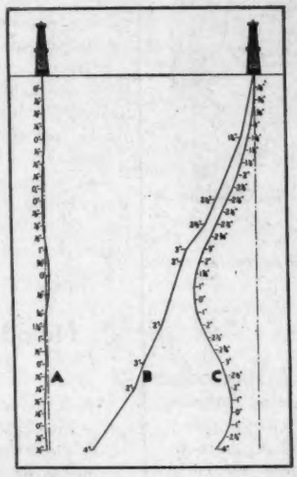
De los tres métodos que ahora tienen poco uso, hay evidencia de un interes renaciente en los de exploraciones magnéticas y eléctricas. El seismógrafo de reflexión y el gravímetro van a la vanguardia de todos los demás métodos geofísicos, y durante el año pasado se ha recurrido más a su utilización que en toda época pasada. Esto se debe a la urgente necesidad de descubrir nuevos yacimientos.

for Controlled Vertical Drilling

CONTROLLED VERTICAL DRILLING METHODS EXPLAINED

Controlled vertical drilling is the practice of confining the entire course of the hole within close limits of a vertical line, regardless of its depth. An example of a well drilled by controlled vertical drilling methods with the aid of a Totco Recorder, plotted from a well log, is shown at A in the diagram.

The successful application of controlled vertical drilling depends upon frequently and accurately determining the effect of the drilling weight upon the bit by checking the angle of the hole just drilled with a precision Recording Instrument so that any slight tendency of the hole to deviate can be immediately halted while the angle is very small. The driller must think in terms of the present record on bottom as compared with the record immediately above it, and the records must be very accurate or he will not really know whether the angle is increasing, decreasing, or remaining the same. Totco records are taken each time a joint of drill pipe is added, or not farther apart than from 50 to 100 feet.



At small angles, the natural plumb bob tendency of the drill string, when in tension and rotated with lighter drilling weight, will quickly straighten the hole in any formation. Then, when the angle is broken, the full amount of weight for most efficient cutting can again be safely applied. This process is repeated continually, with the result that the well is confined to a course that is for all practical purposes vertical. Angles are never allowed to increase to the point where the well establishes a definite directional trend at increasing angles; mechanical means of controlling the course of the hole are therefore unnecessary.

The result of lack of systematic control is shown in B and C of the diagram. The assumed course of the well is shown at B, while the actual course, analyzed from a directional survey, is shown at C. The two serious "dog-legs" which resulted from lack of properly applied control during drilling could have been avoided had Totco records and controlled vertical drilling methods been utilized.

The Totco Recorder was developed especially for use in controlled vertical drilling and has been employed successfully by major operators and drilling contractors in the United States and all foreign countries for years. Its use effects a substantial saving of time, equipment cost, drilling expense, and greatly reduces the number of fishing jobs and mechanical troubles.

CONTROLLED VERTICAL DRILLING METHODS ARE APPLIED BY REGULAR DRILLING CREWS

The Totco Recording Instrument consists of the recording element and the angle indicator, both completely enclosed and factory sealed. The Recording Instrument is encased in a go-devil (two styles are shown at A and B at left) which is run through the drill pipe on a measuring or sand line, or is dropped in the pipe and recovered when the drill string is pulled out. The go-devil completely shields the Instrument from fluid, dirt, and shock.

The Totco Recorder is entirely mechanical, and does not employ liquids, chemicals or electrical apparatus, hence, its operation is unaffected by climatic conditions and well temperatures. Any member of the drilling crew can operate it. The work of inserting the chart, putting the instrument in the go-devil, and starting the go-devil down the drill pipe can be done in one minute. The record is made on a small graduated composition disc and is immediately available to the driller within a few seconds after the go-devil is brought to the surface. The instrument records the angle of inclination precisely, and the record is read easily to ⅛ of one degree. The accuracy of the timing element permits the record to be taken with a stop on bottom not exceeding 30 to 45 seconds.

WRITE FOR THE TOTCO CATALOG AND FULL INFORMATION CONCERNING THE APPLICATION OF TOTCO RECORDERS AND CONTROLLED VERTICAL DRILLING METHODS.

EXPLICACION DE LOS METODOS DE PERFORACION VERTICAL GOBERNADA

La perforación vertical gobernada es la práctica de confinar la completa dirección del agujero dentro de límites exactos de la línea vertical, independientemente de la profundidad. En "A" en el presente diagrama, se muestra en forma diagramática, un ejemplo de un pozo perforado según los métodos de perforación vertical gobernada, con la ayuda de un registrador Totco, tal como aparece en el diario de perforación.

La aplicación satisfactoria de la perforación vertical gobernada depende de la frecuente y exacta determinación del efecto del peso de perforación sobre la barrena verificando el ángulo del agujero recientemente perforado con un instrumento registrador de precisión, de modo que la más leve tendencia a desviación del agujero pueda evitarse mientras el ángulo es todavía pequeño. El perforador debe pensar en los términos del presente registro en el fondo, en comparación con el registro inmediatamente arriba de ese punto, y los registros deben ser muy exactos, pues de lo contrario, no podrá realmente saber si el ángulo está aumentando, disminuyendo o quedando lo mismo. Las acusaciones con el Totco se toman cada vez que se agrega una sección de tubo de perforación, o con no más separación de 50 a 100 pies.

A ángulos pequeños, la tendencia natural de la ploma de la columna o cadena de perforación, cuando está bajo tensión y es girada con peso de perforación más liviano, enderza rapidamente el agujero en cualquier formación. Luego, cuando el ángulo se abre o aparta, la cantidad completa de peso para el corte más eficaz podrá de nuevo aplicarse con seguridad. Este procedimiento se repite continuamente, con el resultado de que el pozo se confina a un curso o dirección que, para todo fin práctico, es vertical. Nunca se permite que los ángulos aumenten hasta el punto en que el pozo establezca una definida tendencia direccional a ángulos crecientes. No hay, por lo tanto, necesidad de valerse de medios mecánicos para gobernar la dirección del agujero.

El resultado de la falta de gobierno o control sistemático se muestra en B y C en el diagrama. El curso o dirección asumida del pozo se muestra en B, mientras que la verdadera dirección, deducida de un estudio direccional, se muestra en C. Las dos serias desviaciones que resultaron de esta falta de gobierno debidamente aplicado durante la perforación pudieron evitarse si se hubiera utilizado la serie de acusaciones con el Totco y los métodos de perforación vertical gobernada.

El registrador Totco fué perfeccionado especialmente para usarse en la perforación vertical gobernada y ha sido empleado con mucho éxito por importantes empresas petroleras y perforadores de pozos en los Estados Unidos de América y el extranjero, desde hace muchos años. Su utilización efectúa una gran economía de tiempo, costo de equipo, gastos de perforación, y por otra parte, reduce mucho el número de trabajos de salvamento e irregularidades mecánicas.

LOS METODOS DE PERFORACION VERTICAL GOBERNADA SE APLICAN POR LAS MISMAS CUADRILLAS ORDINARIAS DE OPERARIOS

El instrumento registrador Totco consta de un elemento de registro y de un indicador de ángulo, ambas cosas muy bien tapadas y selladas en la fábrica. El instrumento registrador se coloca en un go-devil (en A y B, a la izquierda se muestran dos estilos) el cual pasa por el tubo de perforación en un cable de medición o de bomba, o bien es introducido solo en el tubo y recuperado después cuando se saca el tubo. El go-devil da al instrumento protección completa contra el líquido, tierra y choque.

El registrador Totco es completamente mecánico, pues no emplea líquidos, substancias químicas o aparatos eléctricos. Por esta razón, su funcionamiento no es afectado por condiciones de clima o por la temperatura del pozo. Cualquier miembro de la cuadrilla de trabajadores puede manejarlo. El trabajo de insertar la tabla o gráfico, colocar el instrumento en el go-devil y bajar el go-devil por el tubo de perforación, puede hacerse en un minuto. El registro se hace en un disco graduado pequeño, hecho de una composición a propósito, y queda inmediatamente a la disposición del perforador dentro de pocos segundos a continuación de la salida del go-devil a la superficie. El instrumento registra el ángulo de inclinación, con gran precisión, y el registro lee facilmente hasta ⅛ de grado. La exactitud del instrumento indicativo de tiempo permite que la acusación se haga con una parada al fondo que no pasa de 30 a 45 segundos.

PIDANOS EJEMPLAR DEL CATALOGO TOTCO E INFORMACION COMPLETA SOBRE LA APLICACION DE LOS REGISTRADORES TOTCO Y METODOS DE PERFORACION VERTICAL GOBERNADA.

TECHINCAL OIL TOOL CORP., Ltd.

standard equipment, including a potentiometer equipped with a very sensitive galvanometer, a rheostat, a very sensitive milliammeter and a switch gear box. Direct current is preferable for this method, although alternating current may be used. Electrodes and regular geological and surveying equipment are also carried in the field, the whole being transported by a panel truck or station wagon.

In the field, measured traverses are laid out with two or more current stakes at the end positions and high and low-potential electrode pickups at measured intervals on the sides of station location. Current is caused to flow into the ground and that leaving the ground is picked up by the electrodes and measured in millivolts. After readings are recorded the current stakes and electrodes are moved to the next station. Depth penetrations are usually 8 to 16 ft. deeper with each move so that a resistivity log can be constructed which is geologically interpreted.

Portable geophysical recording units, such as this, are used in the more inaccessible portions of the Latin American countries

Aparatos registradores geofísicos portátiles, como el presente, se usan en las regiones más inaccessibles de los paises latinoamericanos

Alternating Current Method

Another method makes use of the fact that the depth of penetration decreases rapidly for increasing frequencies. In this way, the effect of deep horizons may be wiped out by sufficiently increasing the frequency. The wiping out takes place at a more or less definite frequency, depending on the depth and on the electric properties of the medium.

In the field, the electrodes are kept stationary, thus eliminating errors due to proximate effects. In plotting the decreases in potential with increasing frequencies, breaks corresponding to stratigraphic breaks are observed. This method is still in the experimental stage and data are being accumulated.

Logging Methods

The greatest advances in subsurface geology continue to come from new methods of mechanical logging. Logging may be broken down into two principal types; namely, sample logging and mechanical logging. In the latter group, physical properties of rocks penetrated are correlated with changes in stratigraphy as well as with the fluid content. In all cases, inferences must be made, but experience with such standard methods as electrical logging indicates that these inferences may sometimes be made more definitely than by sample logging, although the latter is essential for checks as well as for the specific information which it gives. The debate as to the relative merits of electric logging and core analysis has no place in modern petroleum technology as each supplies information not provided by the other and both are necessary for a full understanding of subsurface conditions, particularly in the permeable horizons.

Among the indirect methods of logging in use in many parts of the country are electric logging, neutron logging, gamma-ray logging, mud logging, drilling-time logging, etc. These have been discussed in previous years. Recent additions to techniques involved in some of these methods follow.

Caliper Logging

Caliper logging is of primary importance in drilling as it measures continuously the diameter of the hole. A set of self-expanding fingers are lowered in the hole and their extension, and hence the diameter of the hole, is recorded electrically at the surface. If the presence and size of cavities are known, the time required for circulation can be established. It is also possible to determine accurately the amount of cement which will be needed to protect the casing. The tool also provides geological information as the tendency of a formation to cave gives some information as to whether it is sand, shale or lime. At the same time, by noting the position of the caved formation with refer-

Métodos eléctricos

El método de exploración por resistividad, lo mismo que la correlación de las formaciones subterráneas, está representado por un equipo que normalmente comprende un potenciómetro provisto de un galvanómetro muy sensitivo, un reóstato, un miliamperímetro muy preciso y un interruptor para el aparato. La corriente contínua es preferible para este método, pero también puede emplearse corriente alterna. Al lugar se llevan también electrodos y los instrumentos geológicos y de exploración ordinarios, transportándose todo en un camión adecuado.

Llegado al lugar, el campo se divide en secciones transversales bien medidas, clavándose dos o más estacas de corriente en las posiciones extremas y receptores de electrodo de alto y baja potencial a intervalos medidos en los lados de cada sección. La corriente se hace pasar por el suelo y parte de ella es recogida por los electrodos y medida en milivoltios. Después de registradas las acusaciones, las estacas de corriente y los electrodos se mueven a la sección siguiente. Las penetraciones de profundidad son de 8 a 16 pies, profundizándose más con cada movimiento, para poder así formar un registro contínuo de resistividad, que después de interpreta geologicamente.

Método de corriente alterna

Otro método se vale del hecho de que la profundidad de la penetración tiene relación directa con el aumento de la frecuencia o periodicidad de la corriente. Por lo tanto, el efecto de los horizontes profundos podrá desaparecer con un aumento suficiente de la frecuencia. La desaparición del efecto se realiza más o menos a una frecuencia definida, dependiendo de la profundidad y de las propiedades eléctricas del medio.

En el punto o campo, los electrodos se mantienen fijos, para suprimir así errores debidos a efectos próximos. Al calcular la reducción las reducciones de potencial, debido al aumento de la frecuencia, se observan interrupciones que corresponden con fallas estratigráficas. Este método está todaviá bajo experimento y se están acumulando datos sobre sus resultados prácticos.

Métodos de reporte diario

Los progresos más importantes en geología subterránea continúan proveniendo de nuevos métodos mecánicos de reporte diario. El reporte diario o contínuo puede dividirse en dos tipos principales, que son el reporte de muestras y el reporte mecánico. En este último tipo se correlacionan las propiedades físicas de las rocas penetradas con los cambios en estratigrafía y contenido del flúido. En todos los casos, deben hacerse inferencias, pero la experiencia con los métodos normales, como el reporte eléctrico, indica que estas inferencias pueden, a veces, hacerse de una manera más definitica, que por el reporte de muestra, a pesar de que este último es esencial para los fines de verificación y por la información específica que suministra. El debate acerca de los méritos relativos del reporte eléctrico y el análisis de los núcleos o muestras, no tiene cabida en la tecnicología moderna del petróleo, pues cada uno suministra una información que no la suministra el otro, y ambos son necesarios para un entendimiento o conocimiento completo de las condiciones subterráneas, particularmente en los horizontes permeables.

Entre los métodos de reporte indirecto, en uso en muchas regiones del país, se incluyen el eléctrico, el de neutron, el de rayo gama, el de lodos, el de tiempo de perforación y otros. Estos métodos han sido explicados en años pasados. A continuación damos información sobre las más recientes adiciones a las técnicas de algunos de estos métodos.

Reporte de compás calibrador

El reporte de compás calibrador es de suma importancia durante la perforación, pues mide continuamente el diámetro del agujero. Un mecanismo de contactos o dedos de extensión automática se baja en el agujero, y su extensión y por lo tanto, el diámetro del agujero, queda electricamente registrado en la superficie. Si se conoce la presencia y el tamaño de cavidades, se puede entonces establecer el tiempo requerido para la circulación. También es posible determinar exactamente la cantidad de cemento que se necesitará para proteger la tubería. La herramienta provee también información geológica a cerca de la tendencia de una formación a hundirse, y también cierta información acerca de si hay arena o material calizo. Al mismo tiempo, tomando nota de la posición de la formación hundida, en relación con otras, es posible evitar errores en correlación, usando los hundimientos, en lugar de la formación, que se está penetrando, para la correlación.

El uso de esta herramienta explica la frequente falla del cemento en levantarse a las alturas esperadas detrás de la tubería, y las causas de otras dificultades con la tubería y la perforación.

Registrador de rapidez de pentración

El reporte contínuo de lodos, que incluye generalmente el reporte de tiempo de perforación, se ha hecho más efectivo mediante un perfeccionado registrador de velocidad de penetración, el cual compensa automaticamente el peso de la barrena o sonda perforadora. Mecanicamente, esto requiere la conexión de un indicador de peso en el instrumento

ence to others, it is possible to prevent errors in correlation by using cavings instead of the formation actually being penetrated for correlation.

Use of the tool also explains the frequent failure of cement to rise to expected heights behind the casing and the causes of other casing and drilling failures.

Rate-of-Penetration Recorder

Mud logging, which generally includes drilling-time logging, has been made more effective by an improved rate-of-penetration recorder which automatically compensates for the weight on the drilling bit. Mechanically, this involves the connecting of a weight indicator into the instrument which records the rate of peneration. When the driller applies more weight to the bit, the drilling-rate curve is automatically adjusted.

Of the factors influencing the rate of penetration, the weight on the bit is the most important. The tendency of a driller is to apply more weight while drilling through tough formations and to reduce it in easily drilled formations. This tends to smooth out the curve and, because of different practices among different drillers, makes correlations difficult.

Measurement of Dip

Many methods have been devised for measuring the dip of cores, but a new one is under development at the present time which measures the dip of formations penetrated by means of electric logging. This consists of lowering three electrodes at angles of 120° to one another, giving three self-potential curves. The orientation of the electrodes is given by means of a photoclinometer so that the inclination of the hole is known.

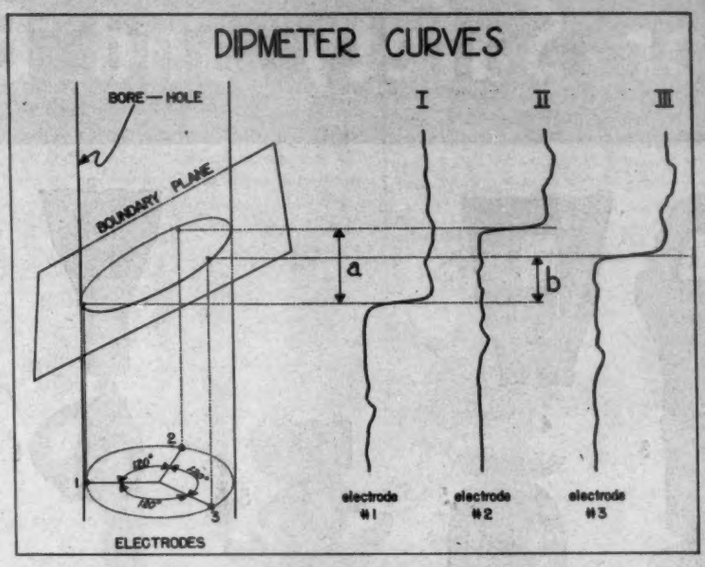


Diagram showing location of "kick" at contact recorded by three electrodes at 120 degrees in a well penetrating dipping beds

Diagrama que muestra la ubicación del "golpe" por contacto registrado por tres electrodos a 120 grados en un pozo que pasa por capas inclinadas

Passage from a porous to a non-porous bed gives an abrupt change on each of the three self-potential logs recorded and if the formations are dipping, there will be discrepancies in the depth at which a contact is recorded. Where the dip is over 10°, the dipmeter gives reliable data on both angle and direction; between 5° and 10° reliable determinations are possible if other conditions are favorable. Around 5°, the direction of the dip can generally be given.

Medición del buzamiento

Se han inventado muchos métodos para medir el buzamiento, pero en vía de perfeccionamiento hay uno nuevo que mide el buzamiento de las formaciones penetradas por medio de un reporte eléctrico contínuo. Este nuevo método consiste en bajar tres electrodos a ángulos de 120 grados entre si, que dan tres curvas potenciales. La orientación de los electrodos es dada por medio de un fotoclinómetro, quedando así conocida la inclinación del agujero.

El paso de un lecho poroso a uno no poroso produce un cambio abrupto en cada uno de los tres reportes de potencial, y da presentarse buzamiento en las formaciones, habrán discrepancias en la profundidad en que se registra el contacto. Cuando el buzamiento es de más de 10 grados, el indicador suministra datos seguros sobre el ángulo y la dirección; entre 5 y 10 grados, las determinaciones seguras son posibles si son favorables otras condiciones. A cerca de 5 grados, la dirección del buzamiento puede darse generalmente con facilidad.

Como las mediciones pueden hacerse a frecuentes intervalos, se podrán observar la convergencia y la divergencia de las capas o lechos, y también los cambios abruptos, los cuales, a menudo significan el cruce de una falla o irregularidad geológica. Como sucede con cualquier otro registrador de buzamiento, el nuevo instrumento es más valioso para inclinaciones acentuadas que para inclinaciones leves, y por esta razón resulta muy valioso en zonas con gran inclinación, sirviendo aquí de guía a la dirección y ángulo a que los agujeros deben desviarse cuando llegan a un fondo de agua.

Developments in Refining
Desarrollos en Refineria

THE end of the first year of war finds the refining industry fully abreast of the distorted situation arising from the world-wide conflict.

One of the first self-imposed duties now is to manufacture adequate supplies of ingredients for making synthetic rubber and in sufficient quantity to fill our war and domestic needs. It had previously guaranteed the production of enough aviation fuel to supply the 60,000 planes a year program announced by the president; the turning out of toluene to meet the rapidly increasing explosives needs; and the production of other synthetics and special products to prosecute successfully this highly mechanized war. Furnishing these supplies using new, and in some cases, virtually untried, processes, is further complicated by the desperate necessity for conserving materials of construction.

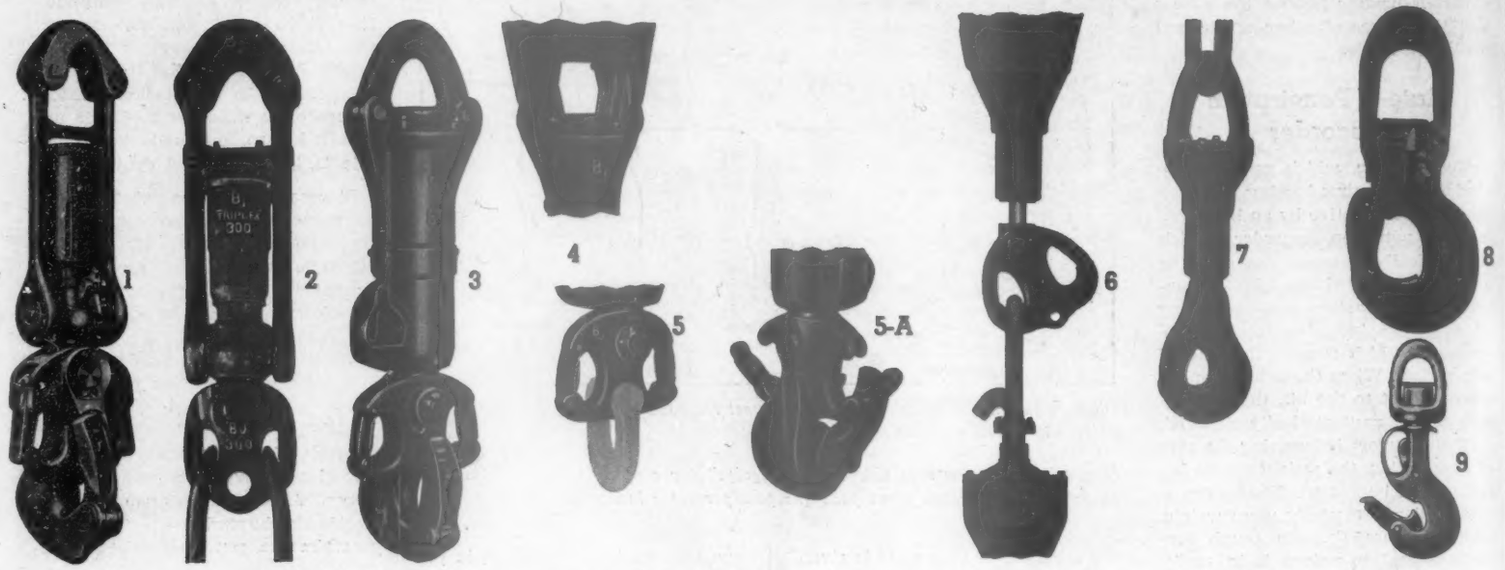
Extensive dislocations in refinery practices are also being experienced in servicing the domestic field. The loss of normal sea-borne transportation of crude oil to the East Coast refiners has resulted in decreased runs there. The continued demand for middle distillates and increased-requirement for industrial fuel have resulted in sharply decreased gasoline production elsewhere. In other interior and coastal refining plants, gasoline rationing and increased fuel-oil requirements both local and

AL final del primer año de la guerra, la industria refinadora del petróleo se encuentra a la vanguardia de la confundida situación provocada por el conflicto mundial.

Uno de los primeros deberes que ella se ha impuesto ahora es la manufactura de adecuados abastecimientos de ingredientes para la fabricación de caucho sintético, en cantidades suficientes para satisfacer nuestras necesidades militares y civiles. Había anteriormente garantizado la producción de suficiente combustible de aviación para el abastecimiento del programa de 60.000 aviones al año, anunciado por el presidente; el suministro de tolueno para satisfacer los crecientes requisitos de explosivos, y la producción de otros sintéticos y productos especiales, para la prosecución satisfactoria de esta guerra tan grandemente mecanizada. El suministro de estos abastecimientos, valiéndose de procedimientos nuevos, muchos de los cuales no han sido todavía ensayados practicamente, viene a complicarse más aún por la necesidad imperiosa de conservar materiales de construcción.

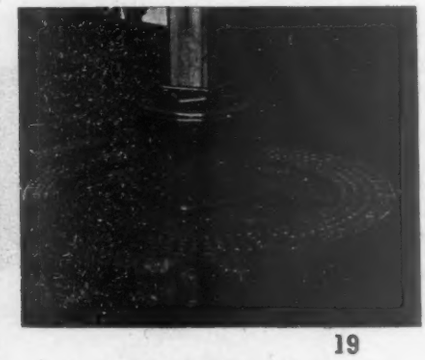
Extensas dislocaciones en las prácticas de la refinación se están experimentando también en el servicio al mercado nacional. La pérdida del transporte marítimo normal del petróleo crudo a los refinadores en la costa del este he tenido por re-

Famous for Safety and Efficiency



(1) BJ Triplex Hooks—with safe locking arms—are made in sizes for 60, 125, 150, 200 and 300-ton loads. (2) This DUPLEX Body exchanges with the TRIPLEX Body by removing only one pin. (3) The "60" Triplex Hook has a recessed swivel lock to prevent rotation. All locking arms are open in view (5-A) to show details; (4) shows direct connection to the traveling block; the clevis (5) is optional—New BJ Combination Tubing Hooks are made for 50-ton and 75-ton loads, and, by removing one pin, can be changed from a SINGLE Body (7) to a DUPLEX Body (6) for workover or perforation cleaning jobs. The 30-ton Tubing Hook (8) has SINGLE Body only—There are BJ Rod Hooks for 10-ton loads (9) also for 15 and 20 tons, all with strong, safe locking arms.

(1) Ganchos Triplex BJ—con brazos de cierre de seguridad—se ofrecen en tamaños para cargas de 60, 125, 150, 200 y 300 toneladas. (2) Este cuerpo DUPLEX se intercambia con el cuerpo TRIPLEX quitándole sólo un pasador. (3) El gancho Triplex "60" tiene un cierre deprimido para evitar la rotación. Todos los brazos de cierre se ven abiertos en la vista (5-A) para mostrar los detalles; (4) muestra la conexión directa al bloque de movimiento; la horquilla (5) es opcional.—Los nuevos ganchos de combinación BJ para tubería se ofrecen para cargas de 50 y 75 toneladas, y quitando un pasador, pueden cambiarse de cuerpo SENCILLO (7) a cuerpo DUPLEX (6) para trabajos corrientes o de perforación. El gancho para tubería de 30 toneladas (8) tiene cuerpo SENCILLO solamente.—Hay ganchos BJ para varillas de bomba, para cargas de 10 toneladas (9) y también para 15 y 20 toneladas, todos con firmes y seguros brazos de cierre.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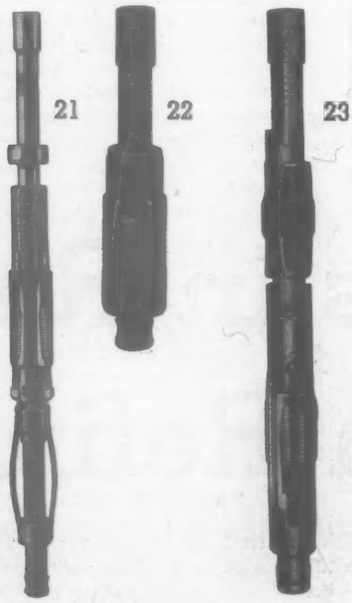

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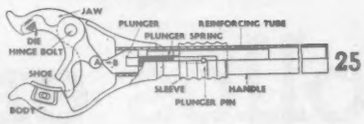
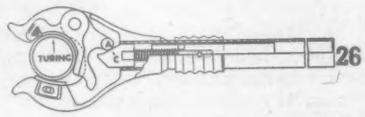
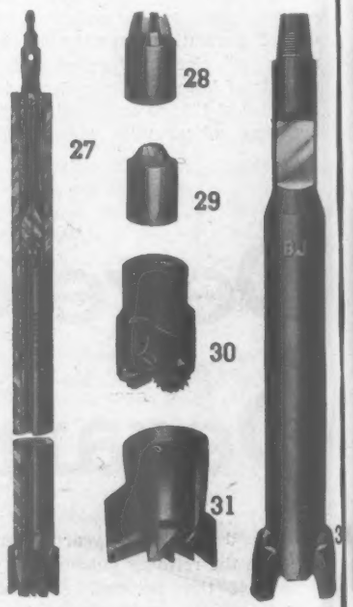






BJ Kelly Bushings (19-20) are successful because they have a shock-absorbing rubber cushion between slips and body; and anti-friction liners. BJ Tubing Catchers (21-22) protect the tubing at all times; may be anchored to stop tubing movement while pumping. Casing Pumps are run-in on sucker rods, then set where desired with the BJ Casing Pump Anchor (23). The new BJ Type TC Tubing Tong (24) remains open (25) until "stabbed" on the tubing (26); a strong spring holds tong safe in place. (27) With a BJ Elliott Wire Line Core Drill you can drill and core in any order you wish, without removing the drilling string from the well. Core Catcher (28) recovers cores from hard formations; (29) from loose sands. Hard Rock Bits (30) or 3-Way Bits (31) are both efficient. (32) BJ (Wilson) Perfection Underreamers never have been equalled for cable tool operation.

Los bujes para kelly (19-20) funcionan muy bien porque tienen un cojín amortiguador de golpe entre las cuñas y el cuerpo, y forros anti-fricción. Los pescatubos BJ (21-22) dan protección a la tubería en todo momento; pueden anclarse para detener el movimiento de la tubería durante el bombaje. Las bombas de tubería van en varillas de bomba y luego se fijan en el punto que se quiera con el encle de bomba de tubería BJ (23). Las nuevas tenazas de tubería BJ de tipo TC (24) permanecen abiertas (25) hasta que tocan la tubería (26); un fuerte resorte las mantiene seguras en su sitio. (27) Con una sonda o perforadora de exploración BJ Elliott de cable de alambre, se puede perforar y sacar núcleos en cualquier orden que se desee, sin quitar la cadena de perforación del pozo. El sacanúcleos (28) saca muestras de formaciones duras; (29) de arenas blandas. Las barrenas de roca dura (30) y las barrenas de tres aletas (31) son todas muy eficaces. (32) Los escariadores ensanchadores BJ (Wilson) Perfection nunca han sido igualados para trabajo con herramienta de cable.

BYRON JACKSON CO., Box 2017 Terminal Annex,
Los Angeles, California.
Please send free copy of the BJ 1942 OIL TOOL CATALOG

Name .....

Position .....Company .....

Address .....

City .....County or State .....

BYRON JACKSON CO., Box 2017 Terminal Annex, Los Angeles, Calif., E.U.A.
Sírvanse enviarme gratuitamente en ejemplar del CATALOGO DE HERRAMIENTAS BJ PARA PETROLEO DE 1942.

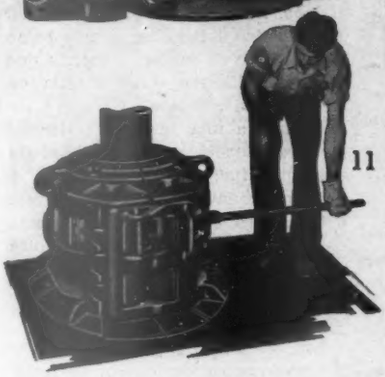
Nombre .....

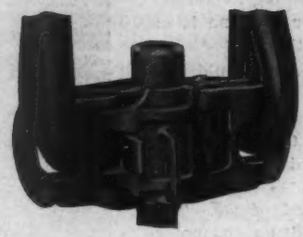
Puesto .....Compañía .....

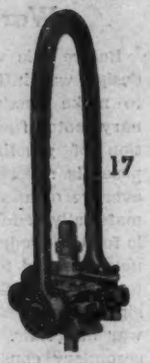
Dirección .....

Ciudad .....País .....

Celebradas por Seguridad y Eficiencia

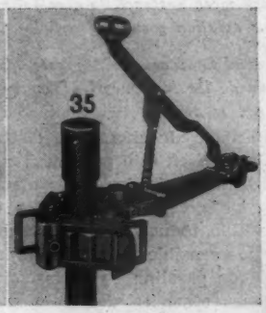


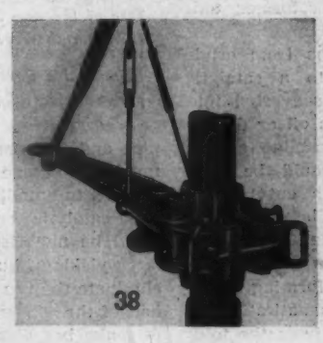


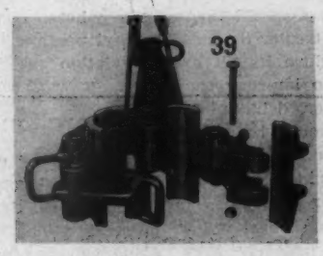


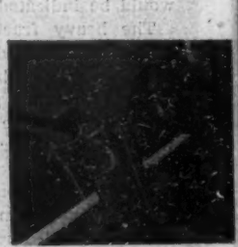
(10) BJ Slip Casing Elevators land the heaviest strings without lifting under collar or coupling. BJ Casing Spiders (11) are safe, easy to operate and do not crush the pipe—New Wire Line Handles (12) make BJ Weldless Links better than ever—Type AA Elevators (13) are made for 300-ton loads; there are two smaller "A" Types also. Type MG Elevators (14) handle external upset drill pipe without using lifting plugs. The Type D (15) is a safe modern elevator for collar type pipe; the Type B (16) is a side door elevator for external upset pipe—BJ Rod Elevators (17) hold sucker rods in vertical position and have latches both front and rear for easy operation; the bail rests at a proper angle (18) for a quick, safe pick-up by the BJ Rod Hook.

(10) Los elevadores BJ para tuberías colocan las cadenas de tubería más pesadas sin levantamiento por debajo del collar o acoplamiento. Las arañas BJ para tubería (11) son seguras, fáciles de manejar y no dañan al tubo.—Los nuevos mangos de cable de alambre (12) hacen que los eslabones BJ sin soldadura sean mejores que nunca.—Los elevadores de tipo AA (13) se hacen para cargas de 300 toneladas; hay también dos tipos "A" más pequeños. Los elevadores de tipo MG (14) manejan tubo de perforación con recalco exterior sin usar tapones de levantamiento. El tipo D (15) es un elevador moderno muy seguro para tubo de tipo de collar; el tipo B (16) es un elevador de puerta lateral para tubo de recalco exterior. —Los elevadores BJ de varillas de bomba (17) sujeta las varillas en posición vertical y tienen pestillos al frente y atrás para facilitar el trabajo; el achicador queda a conveniente ángulo (18) para su enganche rápido y seguro con el gancho BJ.









The new BJ Type B Rotary Tongs fit pipe sizes from 3½ inches to 10¾ inches by merely changing one jaw. See how the same jaw fits 6¼ inch; 5¼ inch; and 4½ inch pipe—(33-34-35). Replaceable hardened bushings prevent wear in jaw sections. The rigid suspension is of sturdy construction, and collapses flat on the tong (36) when moving to another well—The Type C Tongs (37) fits from 2⅜ inches to 8⅝ inches by installing the proper size jaw, and is light and handy to use —When casing is used for the drilling string, BJ Drill Casing Bushings (38-39) unscrew tight joints without crushing the casing; also used for thin or worn casing—The BJ Cat-Line Grip (40) and BJ Rope Guard (41) are modern devices which speed up operations and safeguard crews

Las nuevas tenzas BJ giratorias, de tipo B, se adaptan a tubería de 3½ a 10¾" cambiando sencillamente una mandíbula. Vea cómo la misma mandíbula ajusta a un tubo de 6¼, 5¼ y 4½"—(33-34-35). Los bujes endurecidos removables evitan el desgaste de las secciones de las mandíbulas. La suspensión rígida es de firme construcción, y se suelta de plano en las tenaza (36) al llevarse a otro pozo.—Las tenazas de tipo C (37) se ajustan a tubo de 2⅜ a 8⅝" instalando la mandíbula de correspondiente tamaño, y se usan con facilidad.—Cuando se usa tubería de revestimiento para la cadena de perforación, los bujes BJ para tubería de perforación (38-39) destornillo las uniones apretadas sin aplastar la tubería; también se usan para tubería delgada o desgastada.—El asidero BJ (40) para cable de cabrestante y el rescuardo de cable BJ (41) son dispositivos modernos para acelerar el trabajo y dar protección a los operarios.

BYRON JACKSON CO.

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General Office: **2150 East Slauson Ave., Los Angeles, Calif.**

Mid-Continent Office: **6247 Navigation Blvd., Houston, Texas.**

PLEASE REFER TO THE BJ SECTION IN THE 1942 COMPOSITE CATALOG FOR COMPLETE DESCRIPTIONS OF ALL BJ OIL TOOLS.

SIRVASE VER LA SECCION BJ EN EL CATALOGO COMPUESTO DE 1942 PARA DESCRIPCION COMPLETA DE TODAS LAS HERRAMIENTAS BJ PARA PETROLEO.

on the East Coast, have brought about marked reductions in gasoline yields. The same general picture holds true on the West Coast. These decreases in gasoline yields are raising many problems in those plants making synthetics for war purposes depending on gases from cracking plants for feed stocks.

War Refinery

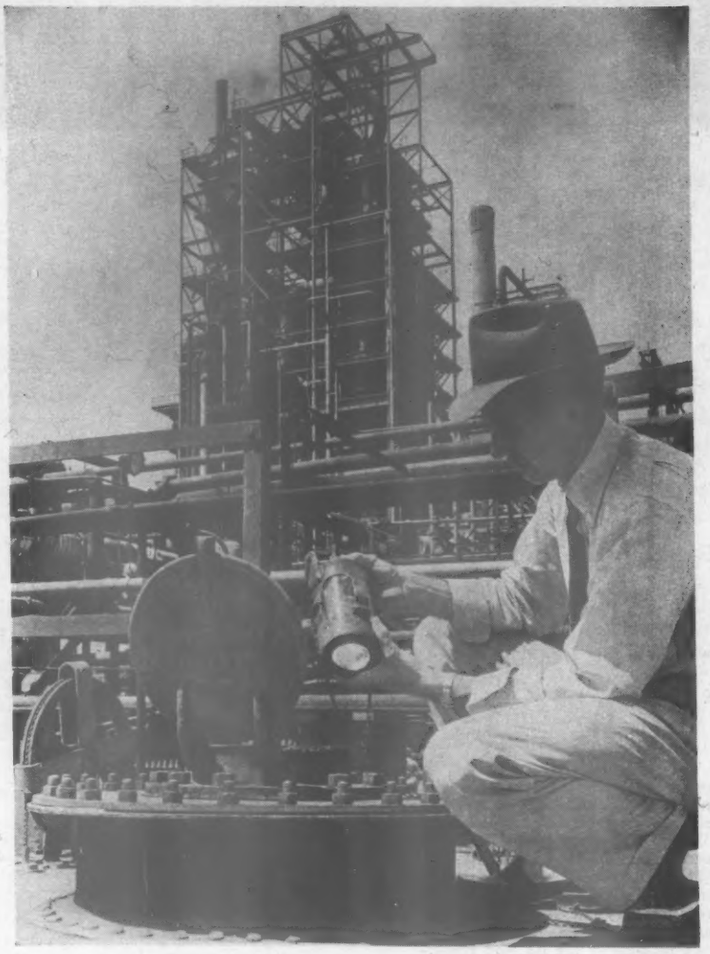
Before this war, general refinery design was influenced by the desire to make maximum yields of ordinary motor fuel. Now the consumption of gasoline for civilian purposes is severely curtailed and the average octane numbers have been materially reduced. The requirement is for the production of critical products essential to the war. A refinery to be built at this time would be designed purely for making maximum war materials. Motor gasoline is of secondary consideration.

A typical new refinery would produce ethyl alcohol, aviation gasoline, butadiene, motor gasoline, fuel oils, styrene, and toluene. Crude oil would be charged to a unit for primary separation into gas, light gasoline, naphtha, and topped crude. The light gasoline would go to motor fuel unless this cut was usable as aviation blending naphtha. The heavy naphtha would go to a thermal or catalytic reforming unit. If butadiene or aviation gasoline is the principal goal, then a thermal unit, such as a polyform unit, would fit. On the other hand, to make maximum toluene, a hydroformer unit would be indicated.

The heavy fractions from crude would be charged to a catalytic cracking unit to be converted into gas, gasoline, and gas oil or domestic fuel oils. The gasoline stream from the cracker could be fractionated to produce a cut rich in aromatics, this would be sent to the toluene extraction unit. To this would be added reformed gasoline, assuming use of a reforming operation employing an aromatization reaction. The raffinate from the toluene extraction unit, plus the balance of the cracked gasoline, would then be sent to a catalytic treater for stabilization, and to reduce its olefin content as well as to improve the octane number. After debutanization, the gasoline would be separated into two cuts; one for use as aviation blending naphtha and the other for use in motor fuel.

The gases from the several units would be separated properly into ethylene, propylene, and a butane-butene fraction. The ethylene could be used to make ethyl alcohol or could be coupled with benzene for the production of styrene, one of the principal ingredients of the buna-S type of synthetic rubber. The propylene could be polymerized to gasoline or converted into isopropyl ether or acetone.

The accumulated four-carbon atom material would be split into two fractions: one containing normal butane and possibly some butenes, and the other containing butenes, isobutane and isobutene. The normal butane and butene may be dehydrogenated to butadiene. The reforming and catalytic cracking operations could be modified to produce very large yields of butenes which would eliminate the use of butane and one-half of the conversion steps required to make butadiene. The other fraction of the cut goes to an alkylation unit where commercial 2-2-4 tri methyl pentane is produced for use in aviation gasoline as isooctanes.



One of the new catalytic cracking installations which were hastened to completion this year to meet United Nations' requirements for aviation gasoline

Una de las nuevas instalaciones desintegradoras catalíticas construidas este año para satisfacer los requisitos de gasolina de aviación de las Naciones Unidas

Operation Adjustable

The ratio of production between these critical materials can be adjusted by shifting feed stocks and processing. The production of butadiene can be increased at the expense of aviation alkylate by charging additional butene to the dehydrogenation unit or, without affecting alkylate production, by converting the ethyl alcohol produced from ethylene into butadiene. The yield of alkylate can be increased by using all of the butenes and some of the fractions on either side, bringing in isobutane to balance from the outside, or producing it by isomerization of normal butane. The maximum utilization of all fractions for the production of butadiene, toluene, aviation gasoline, alcohols, and other

reducido mucho. El requisito principal es la producción de materiales esenciales para la guerra. Una refinería tendría al presente que construirse sobre la base de dedicarse exclusivamente a la producción de materiales de guerra en grande escala. La gasolina para automóviles es cosa secundaria.

Una típica refinería nueva, construida al presente, tendría que producir alcohol de etilio, gasolina de aviación, butadieno, gasolina de motor, petróleos combustibles, estireno y tolueno. El petróleo crudo se cargaría en un equipo para su separación primaria en gas, gasolina liviana, nafta y fracciones volátiles. La gasolina liviana se usaría como combustible de motor, a menos que pudiera utilizarse como mezcla en la nafta de aviación. La nafta pesada iría a una instalación termal o de reformación catalítica. Si el fin principal fuera el butadieno o la gasolina de aviación, entonces vendría al caso una instalación termal, como sería una poliforme. Por otra parte, para la producción máxima del tolueno se necesitaría una instalación hidroformadora.

Las fracciones pesadas del petróleo crudo se cargarían en una instalación desintegradora catalítica, para ser convertidas en gas, gasolina, petróleo de gas o petróleos combustibles. El flujo de gasolina del aparato desintegrador sería fraccionado para producir una fracción rica en aromáticos; esto sería enviado al grupo o unidad de extracción de tolueno. A esto se agregaría gasolina reformada, asumiendo el uso de una operación de reformación que empleara una reacción de aromatización. El refinado de la unidad de extracción de tolueno, más el resto de la gasolina desintegrada, sería entonces enviado a tratador catalítico para su estabilización, y para reducir su contenido de olefina, lo mismo que para mejorar el número octano. Después de la desbutanización, la gasolina se separaría en dos fracciones: la una para uso como mezcla de nafta de aviación, y la otra para uso en combustible de motor.

Los gases de las varias unidades se separarían en debida forma en etileno, propileno y una fracción de butano buteno. El etileno podría usarse para hacer alcohol de etilio o podría unirse a bencina para la producción de estireno, uno de los principales ingredientes del caucho sintético de tipo Buna S. El propileno podría polemerizarse a gasolina o convertirse en alcohol isoprofilio, ester isoprofilio o acetona.

El material acumulado de cuatro átomos de carbón podría separarse en dos fracciones: la una contendría butano normal y posiblemente algunos butenos, y la otra, butenos, isobutano e isobuteno. El butano y el buteno normales pueden deshidrogenarse a butadieno. Las operaciones reformadoras y desintegradoras podrían modificarse para producir grandes rendimientos de butenos, lo cual eliminaría el uso del bu-

sultado una reducción en el trabajo de refinación en este punto. La continua demanda de destilados medianos y los crecientes requisitos de combustible industrial, han resultado en una sensible reducción de producción de gasolina en otras zonas. En otras refinerías del interior y costaneras, el racionamiento de la gasolina y los crecientes requisitos de petróleo combustible, tanto locales como en la costa del este, han producido notables reducciones en rendimiento de gasolina. La misma situación general se repite en la costa del oeste. Estas reducciones en rendimiento de gasolina están suscitando muchos problemas en aquellas refinerías que hacen sintéticos para los fines de la guerra y que dependen de gases provenientes de las plantas desintegradoras para materiales de alimentación.

Refinería en tiempo de guerra

Antes de la guerra actual, el tipo general de refinería estaba influenciado por el deseo de obtener rendimientos máximos de combustible ordinario de motor. Ahora que en consumo de gasolina, para fines civiles, está considerablemente limitado, los números promedios de octano se han

Suministran La Solución a Muchos Problemas del Subsuelo.

RETENEDOR DE CEMENTO "BAKER" MODELO TIPO "K"
(PRODUCTO NO. 400)

Producto No. 400
Retenedor de Cemento "Baker" Modelo Tipo "K" (con Junta de Circulación)

USO:

Provee un medio seguro y sin peligro para poner cemento por la cañería de bombeo o barras de sondeo al lugar donde sea más efectivo, a cualquier lugar predeterminado detrás de la cañería de entubación o la cañería perdida, o alrededor del zapato. Se adapta a cualquier presión dentro del factor de seguridad de la cañería.

APLICACIONES
Recementación
Cementación Detrás de Secciones de Cañería
Reducción de la Relación Gas/Petróleo
Como Tapón para Aislamiento de Flúidos de Fondo
Como Tapón para Zonas Superiores
Cementación a Presión
Cementación de Caños Ciegos Antes de Perforarlos a Proyectil
Cementación de Cañería Rota
Uso del Retenedor como Tapón-Puente en la Cañería de Entubación

CARACTERÍSTICAS SOBRESALIENTES:

FACILIDAD DE OPERACIÓN

Cualquier dotación experimentada puede bajar y colocar con éxito el Retenedor de Cemento "Baker".

UNA OBTURACION POSITIVA

DOS NUEVAS CARACTERÍSTICAS DE CONSTRUCCIÓN aseguran un aislamiento positivo contra la cañería de entubación y evitan cualquier posibilidad de que el flúido circule alrededor. La herramienta se suelta hidráulicamente y cuando está colocada, la empaquetadura resistente al petróleo forma un aislamiento contra la cañería de entubación. **UNA NUEVA CARACTERÍSTICA** es la adición de un anillo de plomo en cualquier extremo del miembro empacador el cual, cuando el último se expande, aisla herméticamente los extremos del empaquetadura resistènte al petróleo, evitando cualquier posibilidad de que el flúido circule alrededor. **OTRA NUEVA CARACTERÍSTICA** es al uso de discos detenedores del flúido, pequeños discos metálicos ubicados en el cuerpo del Retenedor debajo del empaquetadura. Estos discos actuan como compuertas con válvulas y previene cualquier flúido del empaquetadura adentro del cuerpo del Retenedor de Cemento cuando el empaquetadura se comprime.

EL RETENEDOR SE QUEDA DONDE SE LO COLOCA

Dos juegos de cuñas segementadas previenen el movimiento de la herramienta, una vez que está colocada, como sea para arriba o para abajo en el hueco.

LA EFICIENTE VÁLVULA DE CONTRAPRESIÓN

La válvula de Contrapresión de Bola, la cual opera inmediatamente después de que el Retenedor está colocado, previene el retroceso o la nivelación de la lechada.

EL FLÚIDO SE PUEDE EXTRAER

En cualquier tiempo durante la circulación o las operaciones de cementación el flúido se puede pasar alrededor por la Junta de Circulación que está conectada (con una reducción) inmediatamente sobre el Retenedor de Cemento.

ES POSIBLE MANTENER PRESIONES ALTAS

El Retenedor de Cemento "Baker" Modelo Tipo "K" puede soportar con seguridad cualquier presión a que esté sujeto dentro de los factores de seguridad de la cañería en la cual está colocado.

CUPLA FLOTADORA "BAKER"
(Producto No. 101)

Producto No. 101
Zapato Flotador "Baker"

USO:

Sirve para una unidad flotadora en un tiro de caños de entubación. La Cupla se usa generalmente en combinación con un Zapato Guía "Baker" de Acción de Remolino Descendente o con un Zapato Flotador "Baker" de Acción de Remolino Descendente o con otro tipo de Zapato "Baker". Esta Cupla sirve también para detener el tapón de cementación, conservando los deshechos adentro de la cañería de entubación y reduciendo el riesgo de contaminación del cemento afuera del zapato.

ZAPATO FLOTADOR "BAKER" DE ACCIÓN DE REMOLINO DESCENDENTE
(Producto No. 120)

Producto No. 120
Zapato Flotador "Baker" de Acción de Remolino Descendente

USO:

Para la colocación y cementación con seguridad y eficiencia de los tiros de cañería de cualquier longitud.

CARATERÍSTICAS SOBRESALIENTES:

VÁLVULA DE CONTRAPRESIÓN DE TIPO DE BOLA PLÁSTICA asegura un cierre hermético contra alta o baja presión.

LOS ORIFICIOS LATERALES DEL ZAPATO proveen una acción de remolino para lavar y hacer desaparecer los puentes cuando se baja la cañería o barras de sondeo. Durante la cementación esta acción de remolino asegura la mejor oportunidad para una distribución uniforme de la lechada alrededor del zapato y la unión del zapato, con el mínimo riesgo de canalización.

FACILIDAD DE TRITURACIÓN como resultado del uso de concreto especial manufacturado con la Formula "Baker" para hacer el tapón y sección guía del zapato, y el material plástico de que se hace la válvula de contrapresión de bola.

BAKER OIL TOOLS, INC.

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critical products would reduce the motor gasoline yield to a figure far below normal.

Synthetic Rubber

Probably no phase of refining has received such public attention as the manufacture of synthetic rubber. The loss of natural rubber production sources so unexpectedly, created a tremendous problem because war and civilian efforts are greatly dependent on rubber products. Fortunately, the industry had done a good deal of basic work on the production of rubber substitutes and was able to step in and shoulder the task of providing the bulk of the synthetic-rubber requirements.

The various known types of synthetics may be classified into groups. The first starts with diolefins and produces natural rubber (isoprene), buna (butadiene), and methyl rubber (dimethylbutadiene). The second group starts with chloroprene, and produces neoprene and sonprene. The third group starts with diolefins plus modifiers and makes buna-S (butadiene plus styrene), and perbunan or buna-N (butadiene plus acrylonitrile). Another type is butyl compounded of olefins and diolefins. Thiokol, a condensation product of chlorine containing organic compounds and sodium polysulfide, is generally classified as a synthetic rubber.

At present, the principal attention is focused on four types: buna-S, bunà-N, butyl, and neoprene. The last named type is made principally of acetylene which can be produced from refinery gases but, in practice, is not. Acetylene is combined with hydrochloric acid to form chloroprene which is emulsified and polymerized to form neoprene.

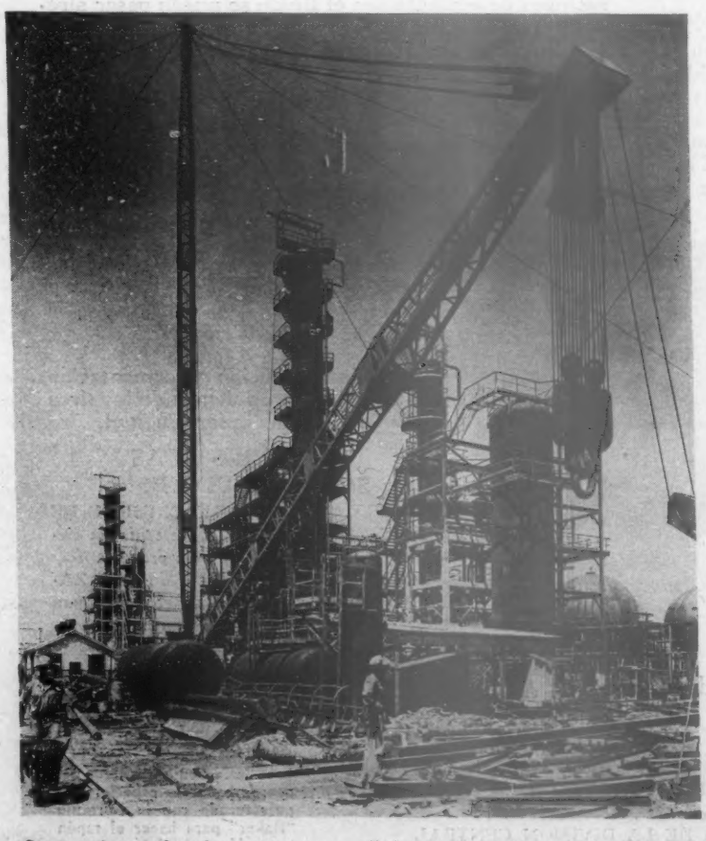
Of the three types starting with butadiene, buna-S apparently will be the mainstay of the synthetic-rubber program. Buna-S is produced by copolymerizing butadiene and styrene in a soap solution. Its properties of stretch and bounce are close to natural rubber.

Buna-N is made by polymerizing butadiene and acrylonitrile, the latter being made of ethylene and hydrogen cyanide. While this type has superior properties in some respects, such as its resistance to oil, it will be made in limited quantities.

Butyl rubber, also to be made in rather limited quantity, is an all-petroleum product, being made of butadiene and isobutylene. It will not make equally durable tires, for the present, but excels natural rubber for many other purposes.

Another type that should be mentioned is flexon or "bathtub rubber," made with little required equipment and designed as a stopgap until the main program is under way. Isobutylene with a small amount of diolefin are put in a vat and dry ice added. Polymerized, rubberlike material appears on the surface and is skimmed off. The amount to be produced depends on the availability of isobutylene and dry ice.

Isobutylene is recoverable from



Construction work under way on a new alkylation plant which will be devoted to production of aviation gasoline

Nueva planta de alquilación bajo construcción, la cual se dedicará a la producción de gasolina de aviación

tano y una mitad de los pasos de conversión requeridos para hacer el butadieno. La otra fracción iría a una unidad de alquilización, donde se produciría pentano trimetilio de 2, 2, 4 de tipo comercial para uso en gasolina de aviación como isooctanos.

Operación ajustable

La relación de producción entre estos materiales esenciales puede ajustarse cambiando los materiales de alimentación y el procedimiento. La producción de butadieno podrá aumentarse a costas del alquilato de aviación, cargando adicional buteno en la unidad de deshidrogenación, o bien, sin afectar la producción de alquilato, convirtiendo el alcohol etilio, producido del etileno, en butadieno. El rendimiento de alquilato podrá aumentarse usando todos los butenos y algunas de las fracciones contiguas, trayendo de afuera isobutano para el contrapeso, o bien, produciéndolo por isomerización del butano normal. La utilización máxima de todas las fracciones, para la producción de butanieno, tolueno, gasolina de aviación, alcoholes y otros productos esenciales, reduciría el rendimiento de gasolina de motor a una cantidad mucho menor que la normal.

Caucho sintético

Probablemente la fase de la refinación que ha recibido más atención pública es la manufactura del caucho sintético. La pérdida de las fuentes de producción de caucho natural, sufrida tan repentina e inesperadamente, creó un problema enorme, debido a que los esfuerzos bélicos y las actividades civiles están tan dependientes de los productos de caucho. Por suerte, la industria había hecho ya mucho trabajo fundamental para la producción de substitutos del caucho y estaba lista para enfrentar la gran tarea de proveer la mayor parte de los requisitos en lo tocante a caucho sintético.

Los varios tipos conocidos de sintéticos pueden clasificarse en varios grupos. El primero empieza con las diolefinas y produce caucho natural (isopreno), buna (butadieno), y caucho de metilo (dimetilabutadieno). El segundo grupo empieza con cloropreno y produce neopreno y sonpreno. El tercer grupo empieza con diolefinas, más modificadores, y produce buna S (butadieno más estireno), perbunano o buna N (butadieno más acrilonitrilo). Otro tipo es el butilo compuesto de olefinas y diolefinas. El Thiokol, un producto de condensación del clorino, que contiene compuestos orgánicos y polisulfitos de sodio, se clasifica generalmente como un caucho sintético.

Al presente, la atención principal se concentra en cuatro tipos: buna S, buna N, butilio y neopreno. El primero de los nombrados se hace principalmente de acetileno el cual puede producirse de los gases de refinería, pero no lo es en la práctica. El acetileno se combina con ácido hidroclórico para formar cloropreno, el cuel es emulsificado y polimerizado para finalmente formar neopreno.

De los tres tipos que empiezan con butadieno, buna S parece que será el punto de apoyo del programa de caucho sintético. El buna S se produce por la copolimerización de butadieno y estireno en una solución de jabón. Sus propiedades de elasticidad y rebote son muy parecidas a las del caucho natural.

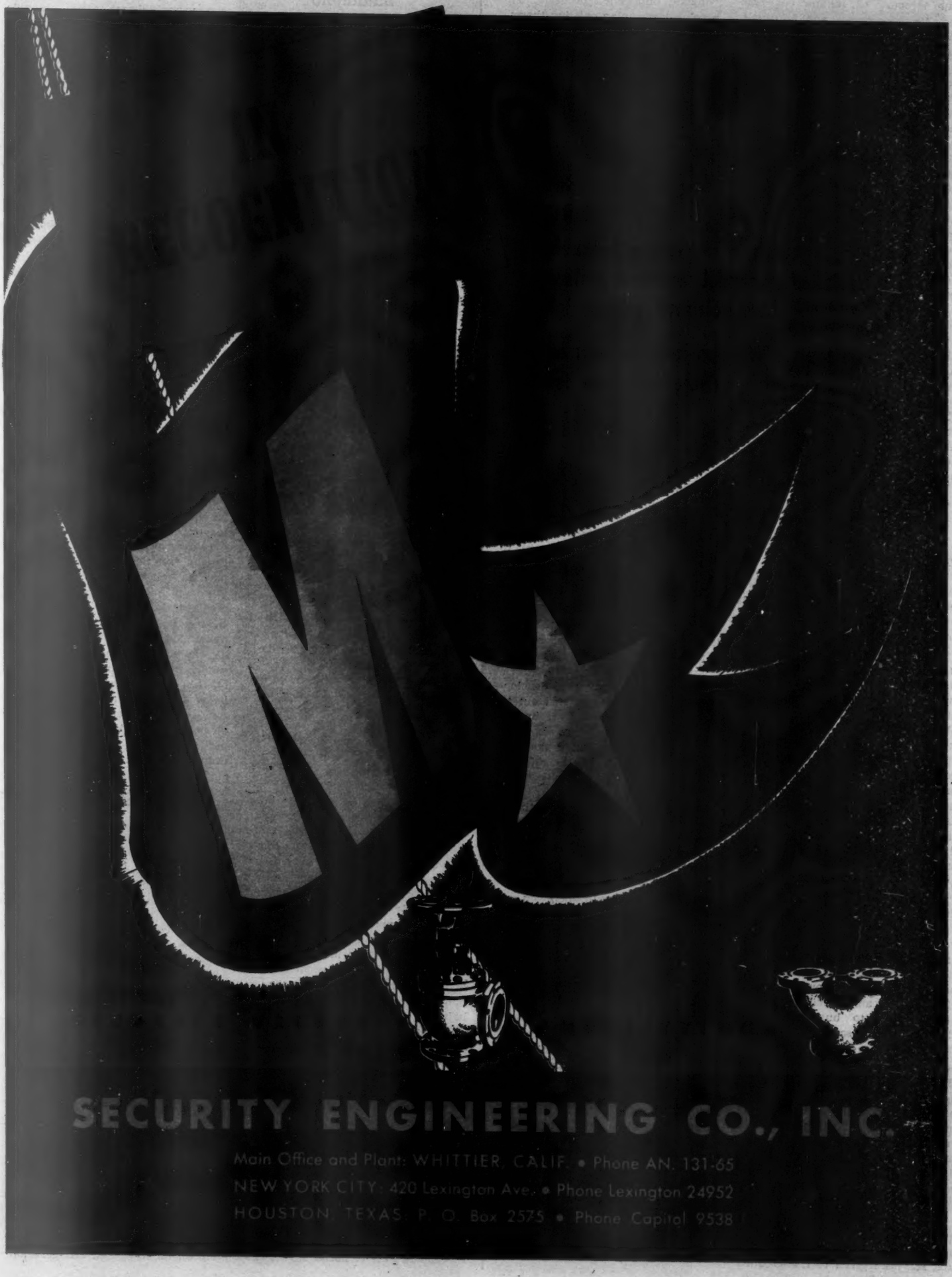
El buna N se hace por polimerización del butadieno y acrilonitrilo, y este último se hace de etileno y cianuro de hidrógeno. Aunque este tipo tiene propiedades superiores, en algunos respectos, como por ejemplo, su resistencia al aceite, se hará en cantidades limitadas.

El caucho de butilo, también por hacerse en cantidad limitada, es un producto enteramente de petróleo, pues sus constituyentes son el butadieno y el isobutileno. No se presta a la fabricación de neumáticos igualmente durables, al presente, pero en otros sentidos, es superior al caucho natural.

Otro tipo que debemos mencionar es el flexon, para cuya producción no se requiere un gran equipo. Servirá para llenar los requisitos urgentes mientras se pone en ejecución el programa principal. Isobutileno con una pequeña cantidad de diolefina se coloca en una tina, y se agrega hielo seco. Polimerizado, sube a la superficie en la forma de un material semejante al caucho, que se desnata en seguida. La cantidad por producirse depende de la disponibilidad de isobutileno y hielo seco.

El isobutileno es recuperable de los flujos de butano que salen de las operaciones de desintegración y se encuentra generalmente en concentraciones de como 13%. El objetivo principal es convertir el isobutileno entraido en un rendimiento máximo de polimeros de 8 y 12 átomos de carbono, y esto se hace por extracción con ácido sulfúrico, seguido por polimerización.

En operación, la alimentación de butano y buteno entra al segundo grado o etapa de ácido. El producto del reactor del segundo grado de ácido pasa a un tambor de sedimentación, donde el extracto ácido se separa de los hidrocarburos. El extracto ácido se calienta para polimerizar el isobutileno, e inmediatamente se enfría con agua, asentándose en dos capas. La capa superior de polimero se lava con soda cáustica y después de se pasada por un tambor de sedimentación se almacena. El butano parcialmente consumido del sedimentador del primer grado de ácido va a la bomba de recirculación y reactor del primer grado o etapa de ácido, donde hace contacto con ácido fresco. El extracto parcialmente saturado del sedimentador del primer grado de ácido se mezcla con la alimentación be butano fresco en la bomba del reactor del segundo grado de ácido y el butano consumido es lavado con soda cáustica y pasado a almacenaje.


SECURITY ENGINEERING CO., INC.
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the streams of butane cut from cracking operations and is usually found in concentrations of about 13 per cent. The chief objective is to convert the extracted isobutylene into a maximum yield of 8 and 12 carbon-atom polymers and this is done by extraction with sulfuric acid, followed by polymerization.

In operation, the B-B, butane-butene, feed enters the second acid stage. The product stream from the second acid stage reactor is passed to a settling drum where the acid extract is settled from the hydrocarbons. The acid extract is heated to polymerize the isobutylene, then immediately cooled with water and settled into two layers. The top layer of polymer is washed with caustic and passed through a settling drum to storage. The partially spent butane from the second acid stage settler goes to the recirculating pump and first acid-stage reactor, where it is contacted with fresh acid. The partially saturated extract from the first acid-stage settler mixes with the fresh butane feed at the second acid-stage reactor pump and the spent butane is washed with caustic and passed to storage.

Butadiene

A very high percentage of the synthetic rubber to be produced will be supplied from butadiene. This hydrocarbon can be produced from ethyl alcohol or petroleum gases and the rubber program is designed to use both sources.

When it was first decided to make a substantial portion from butadiene drawn from refinery sources, butane was considered the most desirable starting material because of its abundance and because its use would not interfere with the aviation-gasoline program. The processes considered at the time required two or more stages for the conversion, necessitating the use of rather large amounts of steel for plant construction. In the process, butane would be dehydrogenated to butene in one stage, followed by extraction of the butene. A second dehydrogenation followed by extraction would convert butenes to butadiene.

The new program as developed involves the use of butylene as a feed stock for single-stage dehydrogenation and extraction of butadiene. It has recently been shown that the Houdry unit can be modified to convert butane to butadiene in a single-stage process.

The fear that the use of butylene as feed stock would interfere with the aviation-gasoline program has apparently been dispelled. It has been shown that the catalytic cracking processes, including the fluid catalyst and movable bed catalyst processes, can be modified to produce such quantities of butylene as required for both the rubber and the aviation-gasoline programs.

In an effort to produce butadiene quickly, while the big plants are under construction, much consideration has been given to the so-called "quickie butadiene" program. This involves revamping existing thermal cracking plants and other equipment. The operation is comparatively uneconomic but would serve as a fill-in with little materials requirement. Generally speaking, high temperatures and low pressures are involved.

Various plans have been considered for the use of existing thermal cracking equipment for conversion of petroleum fractions into butadiene with better than 5 per cent conversion. One method involves cracking in the tubes at temperatures of 1,350° to 1,450° F. However, some difficulty is being experienced in finding sufficient alloy tubes to withstand the temperatures.

Yields of butadiene are improved where the charging stock is heated in the furnace to or above 1,100° F., and then contacted with superheated steam obtained from a regenerative system. The steam is raised to 1,800° F., and, during a short contact time, raises the oil vapors to a temperature of 1,400° F. The mixture of steam and vapor is water-quenched and the butadiene recovered. A variation of this method involves the use of hot flue gas in place of superheated steam. A similar process injects a limited quantity of air into the oil vapors. Self-combustion raises the temperature of the charge to about 1,400° F., the temperature required for formation of the butadiene. Also under discussion is a process in which the hydrocarbons are heated to the limit of the regular heater and then superheated in a preheated refractory brick regenerator.

A substantial amount of development work is being carried out to convert butane to butadiene in one operation. Normal butane is most abundant. It is estimated that between 250,000 and 340,000 bbl. per day are potentially available from all sources. This is several times greater than the proposed synthetic rubber production program. A process for direct conversion of butane would eliminate the intermediate conversion of *n*-butanes to *n*-butenes with the attending savings in construction material and operating expense. A published report by members of the Institute of Gas Technology covering work of this nature is of interest. Butadiene was produced from butane experimentally in a single-stage catalytic process. A selective dehydrogenation catalyst was used at temperatures of 1,100°-1,200° F. and at reduced pressures. It was found that under certain conditions substantial conversion of butane to butadiene was obtained while carbon deposited on the catalyst was negligible, or zero. This low carbon deposition made long on-stream cycles possible. On a single passage, 12.2 per cent of butane was converted to butadiene with less than 0.2 per cent by weight of carbon produced. By recycling, 74 weight per cent of butadiene may be produced with the deposition of only 2.3 weight per cent of carbon on the catalyst.

Butadieno

Un gran porcentaje del caucho sintético por producirse será hecho de butadieno. Este hidrocarburo puede producirse del alcohol etílico o de gases de petróleo, y el programa de caucho comprende el uso de ambas fuentes.

Cuando se decidió primero hacer una buena parte del caucho sintético, usando butadieno proveniente de las refinerías, el butano se consideraba el material más apetecido para el comienzo del trabajo, debido a su abundancia y también en vista de que su uso no perturbaría el programa de la gasolina de aviación. Los procedimientos estudiados entonces requerían dos o más etapas para la conversión, y necesitaban el consumo de grandes cantidades de acero para la construcción de nuevas refinerías. En el procedimiento propuesto, el butano se deshidrogenaría en buteno, en una de las etapas, y el paso siguiente sería la extracción del buteno. A continuación, habría una segunda deshidrogenación, seguida por extracción para convertir los butenos en butadieno.

El nuevo programa desarrollado comprende el uso de butileno, como material de alimentación, para deshidrogenación de una sola etapa, y la extracción del butadieno. Recientemente se ha visto que la unidad de Houdry puede modificarse para convertir el butano en butadieno en un procedimiento de una sola etapa.

El temor de que el uso del butileno, como material de alimentación, pudiera perturbar el programa de la gasolina de aviación, parece que ha desaparecido. Se ha demostrado que el procedimiento de desintegración catalítica, incluyendo los procedimientos corolarios, puede modificarse para producir las cantidades de butileno que se requieran para los programas del caucho sintético y de la gasolina de aviación.

Con el objeto de producir butadieno con rapidez, mientras están bajo construcción las nuevas grandes refinerías, se ha dado mucho estudio al programa del "butadieno rápido." Esto entraña la reforma de las existentes plantas de desintegración termal y de otros equipos. La operación es comparativamente costosa, pero serviría de expediente conveniente, por necesitar muy pocos materiales. En términos generales, en el procedimiento se comprenden temperaturas elevadas y presiones bajas.

Se han estudiado varios proyectos para la utilización de las existentes plantas de desintegración termal, para la conversión de las fracciones del petróleo en butadieno, con más de 5% de conversión. Un método propuesto comprende la desintegración en los tubos a temperaturas de 1350 a 1450° F. Se está experimentando, sin embargo, cierta dificultad en encontrar tubos de aleación que puedan resistir estas temperaturas.

Los rendimientos de butadieno se mejoran cuando el material de carga es calentado en el horno a 1100° F. o más, y puesto luego en contacto con vapor sobrecalentado obtenido de un sistema regenerativo. La temperatura del vapor se levanta a 1800° F., y durante un corto tiempo de contacto, sube la temperatura de los gases de petróleo a 1400° F. La mezcla de vapor y gases es enfriada con agua y se recobra así el butadieno. Una variación de este método incluye el uso de un gas caliente, en lugar del vapor sobrecalentado. Un procedimiento similar recurre a la inyección de una limitada cantidad de aire en los gases de petróleo. La combustión expontánea sube la temperatura de la carga a cerca de 1400° F., que es la que se requiere para la formación del butadieno. También bajo estudio hay otra procedimiento, en el cual los hidrocarburos se calientan hasta el límite del calentador corriente y luego se sobrecalientan en regenerador de ladrillos refractarios precalentado.

Se está llevando a cabo un gran trabajo de desarrollo con el objeto de convertir en butano en butadieno en una sola operación. El butano normal es el más abundante. Se calcula que la cantidad potencialmente disponible de todas las fuentes está comprendida entre 250.000 y 340.000 barriles al día. Esto es muchas veces mayor que lo exigido por el propuesto programa de producción de caucho sintético. Un procedimiento para la conversión directa del butano suprimiría la conversión intermedia de los butanos N en butenos N, con un consiguiente ahorro en materiales de construcción y gastos de explotación. Un informe publicado por los miembros del Institute of Gas Technology, relativo a trabajos de este caracter, es de sumo interes. Se relata en él cómo el butadieno fué producido del butano, experimentalmente, mediante un procedimiento catalítico de una sola etapa. Se empleó un catalizador selectivo de deshidrogenación, a temperaturas de 1100 a 1200° F. y a presiones reducidas. Se vió que bajo ciertas condiciones se obtenía una buena conversión del butano en butadieno, y que la acumulación del carbón en el catalizador era insignificante o nula. Esta baja acumulación de carbón permitía una gran prolongación de los ciclos. En un solo paso, 12,2% de butano fué convertido en butadieno con menos de 0,2% de carbón, por peso, producido. Repitiendo el ciclo o paso, 74% del butadieno puede producirse con una acumulación de sólo 2,3% de carbón, por peso, en el catalizador.

Estireno

El segundo material más importante requerido para la producción del caucho buna S es el estireno. Seguramente la industria refinadora puede ayudar en la manufactura de la bencina etílica, la cual es el producto intermedio en la preparación del estireno. Un método disponible para hacer bencina etílica incluye la producción de etileno por desintegración a alta temperatura, recomprensión de los gases, refrigeración

Styrene

The second most important material required to produce buna-S rubber is styrene. Apparently the refining industry can assist in the manufacture of ethyl benzene which is the intermediate product in the preparation of styrene. One method available for making ethyl benzene provides for the production of ethylene by high-temperature cracking, recompression of the gases, refrigeration, and final recovery in special distillation columns. The ethylene is reacted with benzene in equipment using aluminum chloride and dry hydrogen chloride as catalysts.

Better suited to refinery operation is the Atlantic Refining process, using catalytic polymerization units and other existing refinery equipment to make ethyl benzene from ethyl alcohol and benzene. Ethylene can be used in place of ethyl alcohol whenever available. Generally, a large amount of fractionation equipment is required to segregate ethylene. Another process for making ethyl benzene involves its catalytic synthesis from benzene and ethylene. This requires a large ratio of benzene but toluene is recovered as a by-product. From any method, the ethyl benzene yielded is converted to styrene and the styrene is then copolymerized with butadiene into synthetic rubber.

Toluene

Toluene is the basis for the manufacture of TNT, widely used as a munition of war. The refining industry is called upon to produce in excess of that produced by the coal-tar industry. The principal source seems to be from catalytic cracking of naphtha in the hydroforming unit. In the normal operation of such a unit, a yield of 5 per cent of aromatics is generally obtained. By charging a selected, narrow boiling range fraction, a yield of 15 per cent can be expected. The aromatics can be concentrated by simple distillation and the toluene recovered by extraction.

Other means for making toluene include thermal pyrolysis of cracked gases and that follows in the quick butadiene program.

Aviation Gasoline

The expanding need for 100-octane aviation gasoline was emphasized early and the production of this vital war material has been increased several hundred per cent. The common practice is to make high-octane materials such as isooctane, neohexane, and cumene. These fractions are then blended with isopentane and aviation-grade naphtha

Probably the most widely used high-octane blending agent is alkylate commercial isooctane produced by coupling butylene and isobutane together through means of a catalyst. Butylene is extracted from the gases produced from either thermal or catalytic cracking. Isobutane is likewise extracted from refinery gases but generally is present in insufficient quantity so that the deficiency is made up by isomerization of normal butane or through bringing it from natural-gasoline plants. The two alkylation processes now practiced use sulfuric acid in one case and hydrofluoric acid in the other, as catalysts.

Alkylation, selective polymerization, and dehydrogenation with polymerization are methods used to produce isooctane. Neohexane is produced by thermal alkylation. Isopentane is produced through fractional distillation of refinery or natural gasoline.

The naphtha used for blending can be made from a number of Texas crudes, which yield suitable fractions having octane numbers of 70 to 76. Other low end point, straight-run naphthas can be used, but their generally low-octane numbers reduce total recovery of 100-octane number fuel. Blending stocks can be made by high-pressure hydrogenation and by catalytic reforming and catalytic cracking.

The present trend in producing blending naphtha is to make use of catalytic cracking. Under some circumstances, re-treating is practiced. These naphthas are very high in octane number and reduce the amount of alkylate required. Common practice is to make use of all alkylate and isopentane available and then blend in all of the naphtha that the mixture will stand, so that it can be brought back to 100 octane with 3 cc. of ethyl fluid.

Gasoline

It has been freely predicted that the demand for butanes for conversion into butadiene, aviation gasoline, and other materials for war purposes would eliminate its use in motor gasoline. Since some 6 per

Central control room of the fluid catalytic cracking of Standard Oil Co. (New Jersey) at a location in the United States which must remain a military secret for the duration

Sala del control central de la planta desintegradora catalítica de la Standard Oil Co. (New Jersey) en un punto en los Estados Unidos de América, cuyo nombre ha de mantenerse secreto durante la guerra

y recuperación final en columnas de destilación especiales. El etileno es reaccionado con la bencina en un equipo que usa cloruro de alumino y cloruro de hidrógeno seco como catalizadores.

Mejor adaptado al procedimiento de refinación es el procedimiento Atlántic, que se vale de unidades de polimerización catalítica y de otros existentes equipos de refinería, para hacer bencina etílica del alcohol etílico y bencina. El etileno puede usarse en lugar del alcohol etílico cada vez que exista a mano. Por lo general, se requiere una gran cantidad de equipo de fraccionación, para separar el etileno. Otro procedimiento para hacer bencina etílica comprende su síntesis catalítica de bencina andetilena. Esto requiere una gran proporción de bencina, pero se recobra el tolueno como producto derivado. Sea cual fuere el método, la bencina etílica se convierte en estireno, y éste es simultaneamente polimerizado con butadieno, formando un caucho sintético.

Tolueno

El tolueno es la base para la manufactura de dinamita TNT, tan grandemente usada ahora en la guerra. La industria refinadora está llamada al presente a producirlo en exceso a la cantidad producida por la industria de la hulla y alquitrán. La fuente principal parece ser la desintegración catalítica de la nafta en una unidad hidroformadora. En la operación normal de semejante unidad, se obtiene, por lo general, un rendimiento de 5% de aromáticos. Empleando una carga de una fracción seleccionada de limitada escala de ebullición, puede obtenerse un rendimiento de 15%. Los aromáticos pueden concentrarse por una destilación sencilla y recobrarse el tolueno por extracción.

Otros métodos para hacer tolueno comprenden la pilorísis de los gases desintegrados, lo cual es una consecución del programa del butadieno rápido.

Gasolina de aviación

La creciente necesidad de gasolina de aviación de número octano 100 se dejó sentir desde el principio de la crísis y la producción de este indispensable material de guerra ha sido aumentada enormemente. La práctica corriente es producir materiales de alto octano, como el isooctano y el neohexano. Estas fracciones son luego mezcladas con isopentano y nafta de clase de aviación.

Probablemente el agente de mezcla de alto octano más usado al presente es el alquilato comercial isooctánico, producido por la unión de butileno e isobutano, mediante un catalizador. El butileno se extrae de los gases producidos de la desintegración termal o catalítica. El isobutano es igualmente extraido de los gases de refinería, pero se encuentra presente, por lo general, en cantidad insuficiente, de modo que la deficiencia se compensa por la isomerización del butano normal, o trayéndolo de las plantas de gasolina natural. Los dos procedimientos de alquiladización ahora en práctica, usan ácido sulfúrico en un caso, y ácido hidrofluórico en el otro, como catalizadores.

La alquiladización, la polimerización selectiva, la deshidrogenación con polimerización, son los métodos que se emplean para producir isooctano. El neohexano se produce por alquiladización termal. El isopentano se produce por la destilación fraccional de gasolina refinada o natural.

La nafta usada para la mezcla puede hacerse de varios petróleos crudos de Texas, los cuales producen fracciones adecuadas, que tienen nú-

cent of motor fuel is assumed to be butane, its removal would have a substantial effect on the volatility of the gasoline.

Thermal Cracking

In some respects, thermal cracking operations have had to make a right about face. In normal times, the bulk of motor-gasoline production has come from this source. Now, with rationing and reduced consumption of gasoline, accompanied by directives for decreased percentage yields, operations have been adjusted to produce greater quantities of fuel oil. Generally reduced temperatures have accomplished this objective.

Attention is being given to adjustments in operation to produce intermediate distillates for incorporation into distillate fuels. Addition of cracked distillates is the easiest way to make substantial increases in burning-oil production, although storage instability of these fractions generally prohibits the use of more than 50 per cent in the blend.

Older pressure stills that run to coke bottoms and the newer delayed coking units are of value now, due to the great demand for coke used in making electrodes. The expanded aluminum production which uses up carbon electrodes at a high rate, has made production of petroleum coke most important.

Catalytic Cracking

The "fluid catalyst" catalytic cracking process developed by Standard of New Jersey has been placed into operation on a full-scale basis. The catalyst flows with the oil rather than remaining in a fixed bed so that cracking is carried out in one chamber and regeneration of catalyst in another. Such a method does away with a substantial amount of equipment required for regeneration of catalyst in place. The catalysts employed are ordinary and readily available.

Recent developments in this process indicate that it can be operated under such conditions as to produce enormous quantities of gases rich in butylene and with a very small normal gasoline yield. This means that butylene can be provided for both butadiene and aviation alkylate in substantial quantities without making too much unneeded motor fuel.

A new development in the catalytic cracking field is the Thermofor catalytic cracking process. This appears to be attractive from the standpoint of critical materials required in its construction and from the fact that it can be adapted to existing thermal cracking.

The materials indicated as required for building such a unit are largely carbon steel with the exception of the Si-chromo 4-6 tubes and the internals of the kilns. Electrical and mechanical equipment, including pumps and instruments, are of conventional design. The adaptability of the process to existing equipment is of particular interest at this time when all classes of materials are scarce. The demand for motor fuel is declining which causes the shutdown of thermal equipment. By utilizing the heaters, fractionating towers, stabilizers, pumps, exchangers, and auxiliary equipment of these units in connection with the reactors and regenerators of the new process, much material can be saved. This (T.C.C.) process can produce aviation-gasoline base stock and source material for butadiene and toluene to a greater degree than the conventional thermal unit.

In operation, the reduced crude charge is delivered to a two-coil furnace, where in one coil it is heated for tar separation and in the other is highly heated before entering the reaction chamber. After leaving the reactor, the product is fractionated in a conventional manner. The catalyst operation involves a moving bed with two chambers, one in which the reactions take place and the other for regenerating the catalyst. Regeneration is carried out in the so-called Thermofor kiln. A system of elevators circulates the catalyst between the reactor and the regenerator.

Yields of 35 to 45 per cent of 400-end-point gasoline on a once-through operation are shown and 50 to 60 per cent on a recycling operation from high end-point gas oil. By changing the conditions, some 20 to 35 per cent of a high butylene cut can be made.

Considerable interest has been aroused in the announced Houdry process for making butadiene. The principal point of merit is its ability to convert butane to butene and then to butadiene in a single stage, followed by a single-stage purification process. Other processes now in use require two or more stages to convert butane to butadiene.

With the exception of the vessel containing the catalyst, the physical equipment of the butadiene process is much like that now used in the older Houdry catalytic cracking processes. These catalyst containers are much simpler than required for the cracking plant, consisting of a horizontal tank with a flat, perforated plate in a level position for holding the catalyst bed. The catalyst is a hard granular material similar in form to that used in cracking process. Because of the relative purity of the butane as feed stock, there is much less deposition of carbon on the catalyst bed.

A technique has been developed for making good use of the carbon which deposits on the catalyst bed. The carbon deposit is utilized in place to supply the heat required to split a predetermined quantity of hydrogen from the molecules in a manner to produce high yields of butadiene without adding heat from an outside source. An adiabatic cycle is followed as the heat is generated in burning the carbon, is stored within the catalyst containers and then given up to supply the heat necessary to convert the butane to butadiene. There is no need of circ-

meros octanos de 70 a 76. Podrían también usarse otras naftas más densas, pero sus números de octano generalmente bajos reducen la recuperación total del combustible con octano de 100. Los materiales de mezcla pueden hacerse por hidrogenación a alta presión, por reformación catalítica y por desintegración catalítica.

La presente tendencia en producir nafta de mezcla es atenerse a la desintegración catalítica. Bajo ciertas circunstancias se practica la repetición del tratamiento. Estas naftas son muy altas en número octano y reducen la cantidad de alquilato requerida. La práctica corriente es aprovechar todo el alquilato y los isopentanos disponibles, y luego mezclarlos con toda la nafta que la combinación pueda soportar, de modo que pueda retornarse al octano 100 con tres c.c. de flúido etílico.

Gasolina

Se ha dicho muchas veces que la demanda de butanos, para su conversión en butadieno, gasolina de aviación y otros materiales para los fines de guerra, eliminaría su uso en gasolina de motor. Como cerca del 6% del combustible de motor se asume que sea butano, su extracción tendría un efecto sensible sobre la volatilidad de la gasolina.

Desintegración termal

En ciertos respectos, las operaciones de la desintegración termal han sufrido un cambio radical. En tiempos normales, la mayor parte de la producción de gasolina de motor ha salido de esta fuente. Ahora, con el racionamiento y el reducido consumo de la gasolina, más el acompañamiento de decretos que mandan reducción en porcentajes de rendimiento, las operaciones han sido ajustadas a producir mayores cantidades de petróleos combustibles. Este objetivo ha venido acompañado de temperaturas generalmente reducidas.

Se está dando atención a los ajustes en la operación, para producir destilados intermedios para su incorporación a los combustibles destilados. La adición de destilados desintegrados es la forma más fácil de hacer aumentos considerables en la producción de petróleo de quemar, a pesar de que la inestabilidad de almacenaje de estas fracciones prohibe, por lo general, el uso de más de 50% en la mezcla.

Los alambiques a presión más antiguos y las unidades más recientes de coquificación retardada, son ahora importantes, debido a la gran demanda que ahora existe por coque para hacer electrodos. La ensanchada producción de aluminio, que consume rapidamente grandes cantidades de electrodos de carbón, ha impartido suma importancia a la producción de coque de petróleo.

Desintegración catalítica

El procedimiento de desintegración catalítica por "catalizador flúido," perfeccionado por la Standard Oil of New Jersey, ha sido puesto en operación sobre una base de producción en grande escala. El catalizador fluye con el petróleo, en lugar de quedar sujeto en un punto fijo, de modo que la desintegración se efectúa en una cámara y la regeneración del catalizador en otra. Este método elimina una buena parte del equipo normalmente requerido para la regeneración del catalizador en punto fijo. Los catalizadores empleados son los ordinarios, de fácil obtención.

Recientes desarrollos en este procedimiento indican que puede explotarse bajo ciertas condiciones que producen enormes cantidades de gases abundantes en butileno y con un rendimiento normal de gasolina muy reducido. Esto quiere decir que se puede suministrar butileno para butadieno y alquilato de aviación, en grandes cantidades, sin producir demasiado innecesario combustible de motor.

Un nuevo desarrollo en el campo de la desintegración catalítica es el procedimiento de desintegración catalítica Thermofor. Parece ser muy conveniente, desde el punto de vista de los materiales indispensables que entran en su construcción, y en vista del hecho de que puede adaptarse a la desintegración termal existente.

Los materiales que se requieren para la construcción de semejante unidad son principalmente aceros al carbono, exceptuando los tubos y otros elementos internos, que son de aleación de silicio ye cromo. El equipo eléctrico y el mecánico, incluyendo bombas e instrumentos, son de construcción corriente. La adaptación del procedimiento al equipo existente es de particular interes en estos tiempos en que hay escasez de toda clase de materials. La decreciente demanda de combustible de motor está paralizando el equipo termal. Utilizando los calentadores, torres de fraccionación, estabilizadores, bombas y los demás equipos auxiliares de estas unidades, en conexión con los reactores y regeneradores del nuevo procedimiento, se podrá ahorrar mucho material de construcción. Este procedimiento, llamado T.C.C., puede producir material de base para gasolina de aviación y material de conversión para butadieno y tolueno, en una cantidad mucho mayor que la producida por la unidad termal de tipo ordinario.

En funcionamiento, la carga reducida de petróleo crudo es entregada a un horno de dos serpentines. En uno de los serpentines, la carga es calentada para la separación del alquitrán, y en el otro es grandemente recalentada antes de entrar a la cámara de reacción. Después de salido del reactor, el producto es fraccionado de la manera corriente. La operación catalítica comprende un lecho móvil con dos cámaras. En una de las cámaras se llevan a cabo las reacciones, y la otra sirve para regenerar el catalizador. La regeneración de efectúa en un horno lla-

LIP PROTECTORS

1 Latest development in all-rubber Protectors. An exclusive Patterson-Ballagh improvement. Heavy lips added at top and bottom give full streamlining; prevent drill pipe from "ringing." All sizes.

STABILIZERS

2 For open hole drilling. Stabilize the pipe. Reduce whip in pipe. Prevent excessive tool joint wear. Rubber specially cured, uniform throughout.

TUBING PROTECTORS

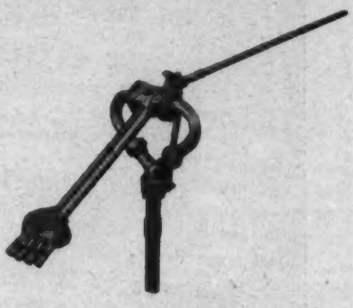
3 Effectively overcome destructive collar wear. Fit over collar or upset of tubing. Made of special oil-resistant plastic material. Many thousands in use.

SUCKER ROD PROTECTORS

4 Prevent rods and couplings from wearing against tubing. Slideably mounted on rod. Made of special oil-resistant plastic material developed for this special purpose by Patterson-Ballagh.

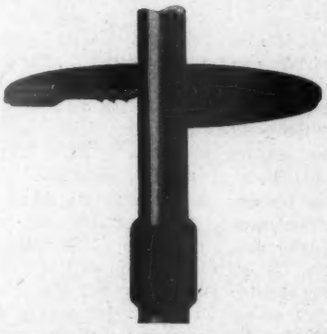
SAFETY MUD GUN

5 Effective device for agitating and mixing mud in pit. Swings in any direction and can be locked in any position. One man can operate. Special long-life packing. Durable rubber nozzle.



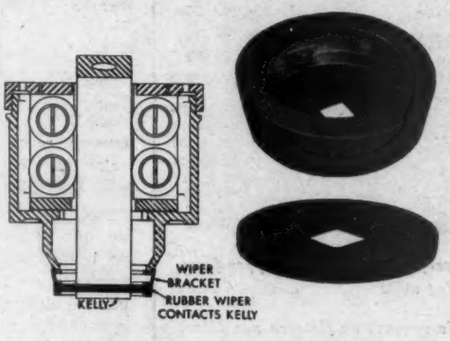
SUPER UNIVERSAL MUD GUN

6 Latest type. Heavy cast steel, double balanced flow, for operations where mud is jetted on 24-hour basis. Locks in any position. Can be equipped with 4-way manifold.



PIPE & TUBING WIPER

7 Heavy-duty one-piece rubber disc, reinforced. Sets under table. Strips pipe and tubing cleanly. Prevents tools dropping into hole. Saves wash water. Sizes 9" to 19".



KELLY WIPERS

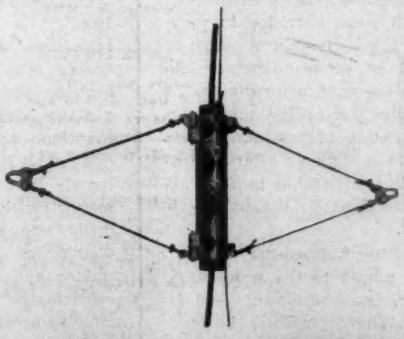
8 Heavy rubber disc completely strips Kelly of mud. Available with square, hexagonal and octagonal openings. Inserted within Kelly bushing. Special fittings.

SUCKER ROD WIPERS

9 Made in two types, Standard and Universal. The latter is illustrated. Compact housing. Two freely floating discs effectively wipe rods.

WIRE LINE WIPERS

10 Two types—Style A and Style B. The latter is illustrated. Steel housing of Type B holds rubber filler block and is held by spring clips. Steel casting is hinged.



WIRE LINE GUIDES

11 Used in every drilling field. Saves wire line. Spark-proof. Prevents vibration. Assures proper spooling. No splinters to fall in crew's eyes. Made in various sizes.

SWIVEL BAIL BUMPERS

12 Prevent wear on swivel and elevator bails. Keep elevator links free from metal-to-metal contact with swivel. Rubber bumper block fitted to castings for every type of swivel.

culating molten salts of any kind, thus saving materials.

Like the Houdry gasoline units, the butadiene plant operates on very short on-stream cycles. Each on-stream cycle is followed by regeneration which removes the deposit from the catalyst and thereby maintains its activity. It is claimed that higher yields are made from the charge, thereby requiring a lesser quantity of butane to produce a given quantity of butadiene.

Another reported use for the Houdry cracking process is in the production of ethyl benzene. A method for adaption of the process has been worked out to charge benzene and either alcohol or ethylene to produce ethyl benzene. A method has been investigated in which the Houdry unit could be used for direct conversion of ethyl benzene to styrene.

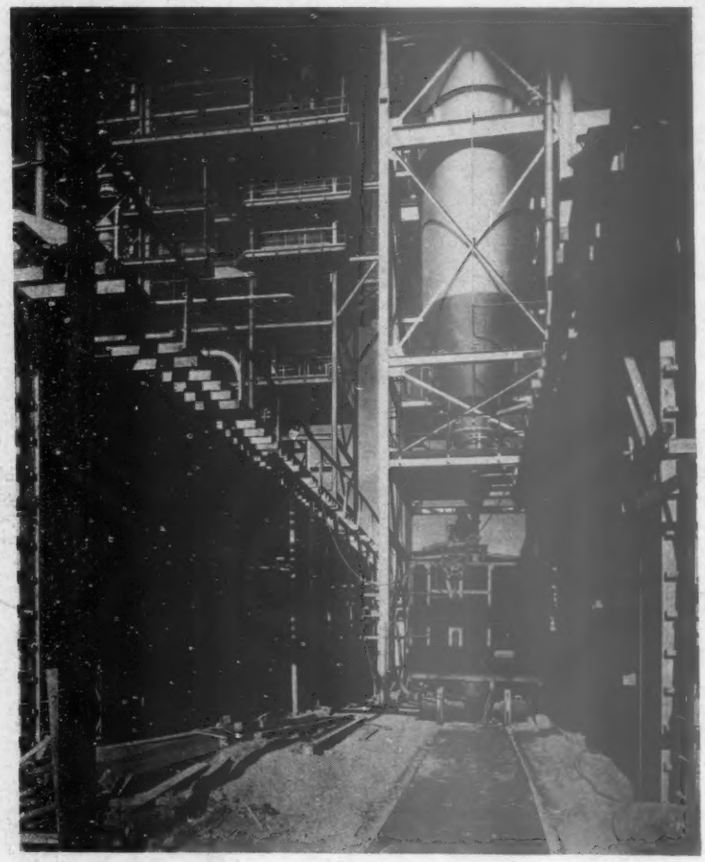
In the Socony-Vacuum ethyl benzene process, ethylene and benzene are charged continuously into a two-case catalytic converter. Regeneration is accomplished by low-pressure air oxidation. A low-pressure blower can be substituted for the high-pressure turbo compressor used in conventional Houdry practice. The primary yield of ethyl benzene may be increased by recycling diethyl benzene and running the unit slightly above optimum alkylating temperatures, or by accumulating the poly ethyl benzenes and periodically charging them together with excess benzene to the unit over the same catalyst.

Catalytic Polymerization

Few new catalytic polymerization plants are being built but practically all existing units still operating are being brought into the war program for the production of essential materials. Products in this category include codimer and ethyl benzene.

The most important need is for the production of codimer in sufficient quantity to satisfy all available hydrogenation equipment. The hydrogenated product will be used in the preparation of 100-octane gasoline. U.O.P. polymerization units can be used for the production of codimer, operating on present feed stocks with some sacrifice in polymer yield. Feed stocks, consisting of either B-B or of stabilizer or absorber-stabilizer gas, are suitable. To insure production of the maximum possible amount of product of the highest octane number after hydrogenation, it is desirable to feed all available butylene to the polymerization unit.

In converting Kellogg-Polyco polymerization plants to the production of codimer, composition of feed is important. Where possible, the feed should be depropanized. Plants with facilities for preparing a B-B feed



Finely powdered catalyst is being unloaded from freight cars into the hopper from which it is delivered as required to catalytic cracking units

El catalizador finamente pulverizado se descárga de vagones de flete en una tólva, de la cual se entrega a las instalaciones desintegradoras catalíticas, a medida que se necesita

mado Thermofor. Se usa un sistema de elevadores para circular el catalizador entre el reactor y el generador.

Los resultados obtenidos son rendimientos de 35 a 45% de gasolina de temperatura final de 400, en destilación contínua, y rendimientos de 50 a 60% de petróleo de gas en destilación repetida. Alterando las condiciones se podrá obtener de 20 a 25% de una fracción rica en butileno.

Mucho interes ha despertado el anuncio del nuevo procedimiento de Houdry para hacer butadieno. Su mérito principal está en su facultad para convertir el butano en buteno y luego en butadieno, en una sola etapa, la cual es seguida por un procedimiento de purificación igualmente de una sola etapa. Otros procedimientos actualmente en uso requiren dos o más etapas para convertir el butano en butadieno.

Con la excepción del recipiente del catalizador, el equipo físico del procedimiento para hacer butadieno se parece mucho al que se emplea ahora en los más antiguos procedimientos de desintegración catalítica de Houdry. Estos recipientes de catalizador son más sencillos que los que se requieren para una instalación desintegradora. Consisten en un tanque o despósito horizontal, con una placa plana perforada, en posición a nivel, para sujetar el lecho del catalizador. El catalizador es un material granular duro, similar en forma al que se emplea en el procedimiento de desintegración. Debido a la pureza relativa del butano, como material de alimentación, hay mucho menos acumulación de carbón en el lecho del catalizador.

Se ha desarrollado una técnica para sacar provecho del carbón que se acumula en el lecho del catalizador. El depósito de carbón se utiliza en su punto para suministrar el calor que se requiere para dividir una cantidad predeterminada de hidrógeno de las moléculas, de un modo que produce altos rendimientos de butadieno sin agregar calor proveniente de fuente exterior. Se sigue un ciclo adiabático, pues el calor generado al quemar el carbón se retiene dentro de los receptáculos del catalizador y se aplica después en el grado necesario para la conversión del butano en butadieno. No hay, por lo tanto, necesidad de circular sales derretidas de ninguna especie, lo que significa ahorro de materiales.

Como las unidades de gasolina de Houdry, la instalación o planta de butadieno funciona sobre ciclos contínuos muy cortos. Cada ciclo es seguido por una regeneración que quita el depósito del catalizador y mantiene así su actividad. Se dice que se obtienen mejores rendimientos de la carga, requiriéndose una menor cantidad de butano para producir una cantidad dada de butadieno.

Otra aplicación práctica del procedimiento de desintegración de Houdry se presenta en la producción de bencina etílica. Se ha desarrollado un método de adaptación del procedimiento a la carga be bencina y alcohol o etileno, para la producción de bencina etílica. También se ha estudiado un método en que la unidad de Houdry podría utilizarse para la conversión directa de la bencina etílica en estireno.

En el procedimiento de la Socony Vacuum, para hacer bencina etílica, el etileno y la bencina se cargan continuamente en un convertidor catalítico de dos cámaras. La regeneración se produce mediante oxidación por aire a baja presión. Un soplador de baja presión puede usarse en lugar del turbocompresor de alta presión que se emplea en la instalación Houdry corriente. El rendimiento primario de bencina etílica podrá aumentarse repasando la bencina dietílica y haciendo funcionar la unidad a temperaturas levemente superiores a las óptimas de alquiladación, o bien, acumulando las bencinas polietílicas y cargándolas periodicamente juntas con exceso de bencina, en la unidad, sobre el mismo catalizador.

Polimerizacíon catalítica

Pocas son las nuevas instalaciones o plantas de polimerización catalítica que se están construyendo, y casi todas las existentes, que continúan todavía trabajando, se han incluido en el programa de guerra, para la producción de materiales esenciales. Los productos en esta categoría son principalmente el codimer y la bencina etílica.

La necesidad más importante es la producción de codimero en suficiente cantidad para satisfacer los requisitos de todo el equipo de hidrogenación existente. El producto hidrogenado se usará en la preparación de gasolina de octano 100. Las unidades de polimerización U.O.P. pueden usarse para la producción de codimer, operando sobre los presentes materials de alimentación, con cierta pérdida en rendimiento de polímero. Materiales de alimentación, como en B-B o el gas de estabilizador o del absorbedor estabilizador, son los más adecuados. Para asegurar el mayor rendimiento posible de producto del más elevado número octano, después de la hidrogenación, conviene alimentar todo el butileno disponible a la unidad de polimerización.

En la conversión de las unidades de polimerización de Kellogg-Polyco a la producción de codimer, la composición de la alimentación es importante. En todo caso posible, la alimentación debe despropanizarse. Las plantas con facilidades para la preparación de una alimentación B-B pueden operarse para producir polímero de alto número octano, mediante ajustes de temperaturas y pérdidas en rendimiento. Las temperaturas recomendadas para la conversión son considerablemente menores que las que se usan por regla general para la polimerización. Para activar el catalizador, hay que elevar las temperaturas y durante estos períodos de activación, el producto

UN MENSAJE DE LA BAASH-ROSS A SUS AMIGOS EN LAS OTRAS AMERICAS

CUANDO SE TERMINE ESTA GUERRA

y podamos todos empren[illegible] nuestro normal trabajo de tiempo de paz, una de las primeras [illegible] Vd. deseará hacer será la renovación de sus herramientas [illegible] petróleo desgastadas y anticuadas, con el equipo más reciente y perfeccionado que haya en el mercado.

Y la Baash-Ross estará lista para ayudarle . . . pues no no hemos suspendido por un minuto nuestro programa de continua investigación y desarrollo, para perfeccionar nuevas y mejores herramientas para la industria del petróleo. Entre los muchos refinamientos de la Baash-Ross, que le ayudarán a Vd. a efectuar el trabajo de una manera mucho mejor, más rápida y segura—y a un costo mucho menor todavía—se encuentran los típicos siguientes . . .

1. BAASH-ROSS "AUTOLOCK" SAFETY JOINT; Type "E"—for drilling strings.

2A. BAASH-ROSS UNITIZED BLOCK WITH LINK ADAPTER ASSEMBLY.

2B. BAASH-ROSS UNITIZED BLOCK WITH HOOK ASSEMBLY. (Right Inset shows Hook open with view of Automatic Latch.

3. BAASH-ROSS DRILL COLLAR SLIPS.

4. BAASH-ROSS SAFETY CLAMP.

5. BAASH-ROSS DRILLING TYPE BUMPER SUB.

6. BAASH-ROSS HEXAGONAL KELLY.

ESTAS HERRAMIENTAS BAASH-ROSS HAN SIDO ESPECIALMENTE PROYECTADAS PARA EL MODERNO TRABAJO DE PERFORACION Y PRODUCCION

1. LA UNION DE SEGURIDAD AUTOLOCK BAASH-ROSS, "TIPO E" está proyectada especialmente para usarse en las cadenas de perforación modernas de alta velocidad. Representa una conexión de fácil desprendimiento en cualquier punto de las cadena, para recuperar la parte principal de la cadena de perforación en caso de que se clave en el agujero. El desprendimiento está, en todo momento, bajo el gobierno del operarion.

2A y 2B. LOS CABALLETES PORTAPOLEAS BAASH-ROSS UNITIZED combinan en un solo grupo el caballete portapoleas y el gancho, ahorrando así valioso espacio de torre en los aparejos portátiles de perforación, extracción y producción. Imparten mayor rapidez, seguridad y eficacia al trabajo. Se ofrecen en dos tipos . . . (2A) Caballete portapoleas con adaptador de eslabón giratorio de resorte, para máxima reducción de tamaño . . . y (2B) Caballete portapoleas con gancho giratorio de resorte (llevando el gancho un pestillo automático, como se ve el grabado insertado). Modelos del 1, 2 y 3 roldanas, con capacidades para 30, 60 y 100 toneladas.

3. LAS CUÑAS DE COLLAR DE PERFORACION BAASH-ROSS son las únicas cuñas *seguras* para sujetar los collares de perforación, tubos de unión lisa, etc. en el plato de la rotativa, para evitar que caigan en el agujero. Los angostos segmentos de las cuñas, flexiblemente articulados, sujetan el tubo a su alrededor completo, dándole una sujeción firme y uniforme, *independientemente del desgaste o deformación del collar*. Un notable adelanto sobre las cúnas de tipo rígido corriente.

4. LA ABRAZADERA DE SEGURIDAD BAASH-ROSS es una de las herramientas más eficaces que existen para su aparejo. Da protección contra la pérdida de tubos de unión lisa, collares de perforación, forros lisos, etc. por caída dentro del agujero, mientras se está formando o separando la cadena. También es ideal como reborde de elevador de emergencia, para trabajo de salvamento o pesca, manejo de tubería empacada de antemano, etc. Se adapta rapidamente a cualquier diámetro, de 3¼" y más.

5. DESTRABADOR BAASH-ROSS para cadenas de perforación, que provee un seguro medio de percusión para soltar la cadena de perforación *tan pronto* como se clava o traba. Produce percusión hacia arriba o hacia abajo, o bien alternadamente, a voluntad del operario. Sencillo. Construido con gran firmeza para el más pesado servicio de perforación.

6. LA JUNTA KELLY BAASH-ROSS HEXAGONAL es la herramienta más sobresaliente de su clase en el mercado. Es ideal para *todos* los modernos trabajos de perforación, a causa de su funcionamiento más expedito . . . mayor firmeza . . . capacidad para resistir mayor esfuerzo de rotación . . . facilidad de mantenerlo en línea recta . . . y mayor circulación superficial. Puede usarse para la perforación corriente y para la perforación bajo presión, sin exigir *cambio alguno*.

Estas y otras herramientas Baash-Ross se describen en detalle en el catálogo compuesto de 1942, páginas 173 a 224 inclusive. Solicite ejemplar del catálogo general de la Baash-Ross.

BAASH-ROSS TOOL CO.

Los Angeles, Calif. — Houston, Texas

Export Office: 30 Rockefeller Plaza, New York, N. Y.

BAASH ROSS TOOL CO.

can be operated to produce high-octane number polymer by temperature adjustments and sacrifices in yield. Temperatures recommended for conversion are considerably lower than normally used for polymerization. To activate the catalyst, temperatures have to be raised and during these activation periods, the polymer product would be sent to regular motor fuel.

A most important function of existing catalytic poly plants is to produce ethyl benzene, which product can be dehydrogenated to styrene. It has been shown that ethyl benzene can be made from ethyl alcohol and benzene using the solid phosphoric acid catalyst used in poly plants for the polymerization of olefins. In this process, ethyl alcohol is dehydrated to ethylene and the benzene is alkylated by the ethylene over the same catalyst. The water liberated by the reaction maintains the degree of hydration of the catalyst necessary for satisfactory operation. Where pure ethylene is available, the same process is applicable, charging ethylene instead of ethyl alcohol, using practically the same operating conditions and maintaining the catalyst activity with the use of added water.

Catalytic Alkylation

The newer alkylation process uses hydrofluoric acid as a catalyst and, like the sulfuric-acid process, couples butylene and isobutane to form an alkylate. Apparently, the process will also couple some propylenes and pentylenes with isobutane, resulting in increased yields. It is reported that the aviation alkylate yield has an octane number of about 91.

Some attention has been given to a process announced for the alkylation of naphtha. Apparently, a very light naphtha is used as feed stock, resulting in substantial yields of relatively high-octane number material.

Catalytic Reforming

The principal reaction involved in Hydroforming is the aromatization or cyclization of the nonaromatic constituents of the naphtha feed stock. In addition, it has been found that a polymer of complex aromatic character is formed from a slight amount of polymerization, amounting to 2 or 3 per cent of the charge. This material is quite dissimilar to other hydrocarbons of the same boiling range, and a study of its characteristics indicates a wide range of usefulness.

It would appear to be particularly useful as a high-boiling rubber solvent. Other uses as a solvent would be in the production of paints and allied materials, and in coating and impregnating products. It apparently has uses as a plasticizer in connection with resins, rubber, ethyl cellulose, and bakelite. The polymer may be used as a wood preservative, or blended with coal tar or fungicides and used to prevent wood decay.

These complex aromatic fractions may be used to produce insecticides and moth-repellant agents. Printing inks, absorber oils, heat-transfer mediums and fogging oils present other uses for the material. The use of polymer as a flushing oil and in the stabilization of residual fuels against sediment formation is indicated. The entire fraction has a high octane number, in the vicinity of 90 A.S.T.M., and could be used for improving the octane rating of tractor fuels. Even with a small yield percentage, the total output will represent a substantial amount due to expansion in hydroformer practice.

Metals and Alloys

A tremendous amount of development work has been carried out in years past by metallurgists and refiners. These studies have permitted the adoption of many new processes that otherwise would not have been feasible. Unfortunately, a great many of the alloying elements that added toughness, oxidation, and corrosion resistance, creep strength, and other important properties are now classed as strategic or critical.

The refining industry is now faced with finding and using substitute materials wherever possible. In addition, a reduction in the number of varieties used is sought. Expense and short life are generally expected.

It has been suggested that all tubing needs be met through the use of either low carbon steel; low carbon, 0.5 per cent molybdenum steel; 2-3 per cent chromium, 0.5 per cent molybdenum steel; 7-9 per cent chromium, 0.5 per cent molybdenum steel; and 18 per cent chromium nickel steel. It has also been pointed out that electric-welded tubing and butt-welded pipe should be used where possible in place of seamless tubing because the tubing is needed in the manufacture of bombs.

A serious bottleneck exists in valves and fittings. Cast-iron valves are urged as substitutes for steel, particularly in small sizes. Also, the use of alloy steel in valve bodies is discouraged.

It is suggested that nonferrous metals be used sparingly or not at all if that be possible, while keeping safety and continuity of operation in mind.

In general, refiners have been asked to utilize for the time being the existing equipment rather than reach for new, and possibly more appropriate types.

Treating

A gasoline-treating method which has received attention this year is the Bender lead sulfide treating process. Control is placed on the addition of sulfur and its more efficient use has lessened the extent to which oxygen is needed to contact the chemicals and oil, which

polímero se enviaría a combustible regular de motor.

Una función muy importante de las existentes unidades catalíticas es producir bencina etílica, producto que puede deshidrogenarse a estireno. Se ha visto que la bencina etílica puede hacerse de alcohol etílico y bencina, empleándose el catalizador sólido de ácido fosfórico, que se utiliza en las unidades de polimerización para polimerizar las olefinas. En este procedimiento, el alcohol etílico se deshidrata a etileno y la bencina se alquilata por el efecto del etileno sobre el mismo catalizador. El agua que se desprende de la reacción sirve para conservar el grado de hidratación del catalizador, que es necesario para la satisfactoria operación. Cuando hay a mano etileno puro, el mismo procedimiento es aplicable, cargando etileno, en lugar del alcohol etílico, usando casi las mismas condiciones de operación y manteniendo la actividad del catalizador mediante la adición de agua.

Alquilatación catalítica

El más reciente procedimiento de alquilatación usa ácido hidrofluórico como catalizador y a semejanza del procedimiento con ácido sulfúrico, une el butileno al isobutano para formar un alquilato. Aparentemente, el procedimiento podrá también unir algunos propilenos y pentilenos con isobutano, resultando en mayores rendimientos. Se dice que el alquilato de aviación tiene un número octano de cerca de 91.

Se ha dado cierta atención a un procedimiento anunciado para la alquilatación de la nafta. Seguramente se uará una nafta muy liviana, como material de alimentación, resultando en rendimientos considerables de material de un alto número octano.

Reformación catalítica

La reacción principal entrañada en la hidroformación es la aromatización o ciclicación de los constituyentes no aromáticos del material de nafta de alimentación. Por otra parte se ha visto también que un polímero de caracter aromático complejo se forma de una pequeña cantidad de polimerización, que sube a 2 o 3% de la carga. Este material es bastante diferente de otros hidrocarburos comprendidos en la misma escala de ebullición, y un estudio de sus características indica un amplio campo de utilización.

Parece que es particularmente útil como disolvente de caucho de alta ebullición. Otros usos, como disolvente, serían en la producción de pinturas y materiales congéneres, enchape e impregnación de productos diveros. Aparentemente tiene aplicaciones como material plástico en conexión con resinas, caucho, celulosa etílica y baquelita. El polímero podrá usarse como preservativo de madera, o mezclado con alquitrán de hulla o con fungicidas podría emplearse para impedir la putrefacción de la madera.

Estas complejas fracciones aromáticas pueden usarse para producir insecticidas y preparaciones contra la polilla. Las tintas de imprenta, aceites absorbentes, medios de transferencia de temperatura y aceites nubladores, son otros usos de este material. El uso del polímero como un aceite de limpieza y en la estabilización de combustibles residuales, contra la formación de sedimento, resulta satisfactorio. La fracción completa tiene un alto número octano, cerca de 90, según el patrón de la A.S.T.M., y podría usarse para mejorar el número octano de los combustibles de tractores. Aun con un pequeño porcentaje de rendimiento, la producción total representará una cantidad considerable, debido a la expansión de la práctica de la hidroformación.

Metales y aleaciones

Un enorme trabajo de desarrollo se ha llevado a cabo, por muchos años, por los metalurgos y refinadores. Estos estudios han permitido la introducción de muchos procedimientos nuevos, que de otra manera no habrian sido factibles. Desgraciadamente, numerosos elementos de aleación que imparten dureza, resistencia a la oxidación y corrosión, y otras importantes propiedades, están ahora clasificados como materiales primordiales a estratégicos.

La industria refinadora está ahora enfrentando la obligación de descubrir y usar materiales substitutos en todo caso posible. Por otra parte, se busca una reducción en el número de variedades usado. Se anticipan mayores gastos y menor duración.

Se ha sugerido que todas las necesidades de tubos se satisfagan mediante el uso de acero de bajo contenido de carbono; acero con 0,5% de molibdeno; acero con 2-3 & de cromo y 0,5% de molibdeno; acero con 7-9% de cromo y 0,5% de molibdeno; y acero con 18% de cromo y níquel. También se ha recomendado el uso de tubería con soldadura eléctrica y tubos de soldadura a tope, lo más que se pueda, en lugar de la tubería sin soldadura, a causa de que éste se necesita para la fabricación de municiones.

También se presentan problemas en el abastecimiento de válvulas y accesorios. Se recomienda el uso de válvulas de hierro fundido, en lugar de las de acero, particularmente al tratarse de las de tamaños pequeños. Se ha limitado mucho el uso de aleación de acero en la construcción de los cuerpos de válvula.

Tratamiento

Un método de tratamiento de gasolina que ha recibido atención este año es el procedimiento Bender, a base de súlfuro de plomo. El gobierno reside en la adición de azufre y su uso más eficaz he reducio el grado a que el oxígeno tiene necesidad de mantener contacto con las substancias químicas y el petróleo, lo cual ha resultado en un ahorro considerable en la cantidad de

Blazing new trails in petroleum refining!

The theory of catalytic refining is not new to petroleum engineers. For years, forward looking scientists have explored catalytic cracking by which petroleum molecules can be taken apart and put together again in different patterns to form new or better products.

In this field, no name commands greater respect than that of Houdry Process Corporation. It was the first to use the principle of catalytic cracking commercially. And probably no development has had a greater effect on petroleum refining. Without catalytic cracking, the war-time requirements of the United Nations for 100 octane gasoline could not have been met.

Today, over a billion gallons of gasoline are produced annually by Houdry units in North America. Much of this gallonage is 100 octane aviation gasoline which enables the warplanes of United Nations to fly higher, farther and faster with greater loads than the enemy.

When Japan crashed through Malaya and seized a large portion of the world's source of natural rubber, Houdry engineers met this challenge in amazingly short time. Today, both butadiene and styrene—the main ingredients of synthetic rubber—can be produced from petroleum by the Houdry Process.

Ever since 1936 when the first large scale plant was completed, Houdry research has never stopped. More than two hundred Houdry experts are working day and night on new applications and further development of catalytic processes.

Leading petroleum companies of the world have been quick to appreciate the advantages this new process offers. Higher yields are obtained at lower temperatures; plants can be built in minimum time and with minimum use of critical materials. Investments totalling more than 100 millions of dollars have already been put into the Houdry plants now in use.

Houdry Processes are offered under license arrangements to all refiners in the United Nations of North and South America and throughout the world. (Subject to approval of U. S. Government for the duration of the war in certain cases.)

Un milagro en la refinacion del petroleo

La teoría de la refinación catalítica no es una novedad para los ingenieros de la industria petrolera. Desde hace años, hombres de ciencia han explorado la desintegración catalítica, en virtud de la cual, se separan las moléculas del petróleo y se juntan luego de nuevo, en disposiciones diferentes, para formar nuevos o mejores productos.

En este campo, no hay nombre que inspire más respeto que el de la Houdry Process Corporation. Esta compañía fué la primera en aprovechar comercialmente el principio de la desintegración catalítica. Y probablemente ningún otro desarrollo ha tenido un mayor efecto sobre la refinación del petróleo, que el presente. Sin la desintegración catalítica, no se habrian satisfecho los requisitos de gasolina de octano 100 de las Naciones Unidas, en tiempo de guerra.

Actualmente, más de mil millones de galones de gasolina se producen anualmente en la América del Norte, mediante las instalaciones de Houdry. Gran parte de esta cantidad es gasolina de aviación de octano 100, la cual habilita a los aviones militares de las Naciones Unidas para volar a mayor altura, a mayores distancias y con mayor rapidez, transportando mayores cargas que los aeroplanos del enemigo.

Cuando los japoneses invadieron a Malaya y se apoderaron de una gran parte de la fuente de abastecimiento de caucho natural, los ingenieros de la Houdry respondieron a este desafío en un tiempo sorprendentemente corto. Hoy en día, tanto el butadieno como el estireno—los principales ingredientes del caucho sintético—pueden producirse del petróleo por el procedimiento de Houdry.

Desde 1936, año en que quedó establecida la primera instalación en grande escala, la investigación por parte de la Houdry no ha cesado un solo instante. Más de doscientos expertos de la Houdry están trabajando día y noche en perfeccionar nuevas aplicaciones y adicionales refinamientos de los procedimientos catalíticos.

Las principales empresas de petróleo, en todas partes del mundo, no han tardado en comprender las ventajas que les ofrece este nuevo procedimiento. Mediante él se obtienen mayores rendimientos a menores temperaturas; instalaciones pueden construirse en muy breve tiempo y con un uso mínimo de materiales esenciales. En las instalaciones que siguen el procedimiento de Houdry, actualmente en uso, se han invertido ya más de 100 millones de dólares.

HOUDRY PROCESS

Los procedimientos de Houdry se ofrecen sobre la base de permiso o licencia a todos los refinadores en las Naciones Unidas de la América del Norte y del Sur y otros países del mundo. (Los arreglos están sujetos a la aprobación del Gobierno de los Estados Unidos de América durante el período de la guerra, en ciertos casos.)

THE HOUDRY PROCESS CORPORATION, Wilmington, Delaware, U.S.A.

Inquiries can be addressed to Houdry Process Corporation or to the following licensing agents:

E. B. BADGER & SONS
Boston, Massachusetts

BECHTEL-McCONE-PARSONS CORP.
Los Angeles, California

THE LUMMUS COMPANY
New York City, New York

has resulted in a substantial savings in the quantity of chemicals needed for sweetening. By developing a system where sulfur is the main reactant and where oxygen is used sparingly, several of the practical difficulties involving the use of air or oxygen are eliminated.

The catalyst is precipitated lead sulfide on a suitable carrier. A lead compound is used as a pellet shell which is effectively converted to carry a coating of sulfide after the catalyst material has been constructed and in place, ready for use.

The operation is fairly simple. Sulfur is supplied from separate pots and is fed into the sour stream. Pressure-differential valves and bypass lines control the amount of sulfur added. The sour stock then enters the base of the catalyst towers at a point near connections for the injection of caustic solution, air, and steam. The air or steam is arranged to assist in dispersing the caustic solution into the oil entering the towers. To obtain the maximum length of service from a catalyst bed, care must be used to remove as much of the injected caustic as possible. A small quantity of live steam is continuously injected for this purpose. Air is used sparingly because its action tends to destroy the catalyst along with the sweetening action.

It is reported that the system functions efficiently on any refinery product which requires mercaptan conversion. Other advantages claimed include reduced chemical and operating costs, low treating losses, flexibility, minimum of attention, and the use of a relatively small amount of equipment.

substancias químicas requeridas el tratamiento. Desarrollando un sistema en que el azufre es el reactante principal y el oxígeno se usa moderadamente, se han suprimido varias de las dificultades prácticas que se presentan en el uso de aire u oxígeno.

El catalizador es súlfuro de plomo precipitado, dispuesto en un agente adecuado. La operación es bastante sencilla. El azufre es suministrado de depósitos separados de azufre, y alimentado a la corriente ácida. Válvulas diferenciales de presión y tubos en derivación regulan la cantidad de azufre añadida. El material ácido entra entonces por el fondo de las torres del catalizador, a un punto cerca de las conexiones para la inyección de la solución cáustica, aire y vapor. El aire o el vapor esta dispuesto para ayudar en la dispersión de la solución cáustica dentro del petróleo que entra en las torres. Para obtener una duración efectiva máxima de un lecho catalítico, debe darse atención a quitar lo más que se pueda la solución cáustica inyectada. Una pequeña cantidad de vapor caliente se inyecta continuamente para este fin. El aire se usa muy moderadamente, pues su acción tiende a destruir el catalizador y la acción de tratamiento.

Se dice que el sistema funciona efectivamente con cualquier producto de refinería que necesite conversión de mercaptano. Otras ventajas que se le atribuyen son reducido costo de substancias químicas y de trabajo, bajas pérdidas de tratamiento, adaptación, atención mínima y el uso de una cantidad relativamente pequeña de equipo.

Operation of Pipe Lines

Operacion de Lineas de Tuberia

PIPE-LINE developments in 1942 have been largely governed by requirements arising from the war situation. Since petroleum transportation from the Gulf Coast to East Coast points has been seriously disrupted by the sinking of tankers by submarines, it has become necessary to make drastic changes in pipe-line systems of the United States. This has meant reversal and conversion of existing lines on a large scale in both the eastern and western areas. Large loading racks have been built at pipe-line terminals for rail shipments.

The dominating events of the year have been the completion of the Plantation system which is now being expanded so as to move refined products from Gulf Coast plants to a terminal in the Chesapeake Bay area; and the construction of the 530-mile 24-in. War Emergency Pipeline from East Texas to southern Illinois which will be extended to East Coast points. These two projects represent the materialization of plans which had been considered before the United States entered the war. They make a direct connection between producing and refining areas and important markets so that low-cost transportation may be obtained.

24-In. Crude-Oil Line

Since the Texas-Illinois 24-in. line is a distinct innovation in pipe lining, it is interesting to compare the cost with that of a line laid with 12-in. pipe. Up to the present, 12-in pipe has been the maximum diameter used for major systems in the United States. A large part of the Plantation main line is made of 12-in. pipe.

On the basis of costs prevailing at the beginning of this year, the cost of a 12-in. line has been estimated to be approximately $22,000 per mile which is the equivalent of more than 44 cents per barrel daily capacity. A 24-in. line, with a daily capacity close to 300,000 bbl. of the same crude, has been estimated to cost more than $60,000 per mile, equivalent to about 20 cents per barrel daily capacity. The capital costs of transporting oil through the 24-in. line is only about 45 per cent as much per barrel of capacity as it would be for the capacity of a 12-in. line. Owing to increased labor and equipment costs, as well as the necessity for pushing construction of the 24-in. Texas-Illinois line to completion this year, it is reasonable to expect that the cost of War Emergency Pipeline will exceed this estimate to some extent.

The economic and engineering effects of the Plantation and War Emergency projects promise to be far reaching, and it is possible they may represent the beginning of a new era in pipe lining in the United States.

Construction Methods

In the laying of the 24-in. Texas-Illinois line, there have been a number of interesting developments. Although it has been customary to lay large-diameter pipe by the roll-weld method, experience of some of the

LOS desarrollos en oleoductos en 1942 han sido gobernados principalmente por los requisitos surgidos del estado de guerra. Como el transporte de petróleo de la Costa del Golfo a la costa del este ha sido seriamente interrumpido por el hundimiento de buques tanques por los ataques de submarinos, se ha impuesto la necesidad de hacer cambios radicales en los sistemas de oleoductos o líneas de tubería de los Estados Unidos de América. Esto ha implicado el trastorno y la conversión de los sistemas existentes, tanto en la zona del este como en la del oeste. Grandes plataformas de carga se han construido en las estaciones terminales de los sistemas de oleoductos para facilitar los embarques por ferrocarril.

Los acontecimientos dominantes del año han sido la terminación del sistema Plantation, el cual se está ensanchando para facilitar el movimiento de los productos refinados de las plantas en la Costa del Golfo a una estación terminal en la zona de la bahía de Chesapeake; y la construcción del gran oleoducto de 24 pulgadas de diámetro por 530 millas de longitud, por parte del Gobierno, que se extenderá desde la región del este de Texas hasta la parte sur de Illinois, y se prolongará después a puntos en la costa del este. Estos dos proyectos representan la realización de planes que fueron estudiados antes de la entrada de los Estados Unidos de América a la guerra. Establecen una conexión directa entre las zonas de producción y de refinación, y los mercados importantes de consumo, ofreciendo el beneficio de un transporte económico.

Oleoducto de 24 pulgadas

Como el oleoducto de 24 pulgadas entre Texas e Illinois representa una interesante innovación en línea de tubería, resultará muy informativa la comparación de su costo con el de una línea tendida con tubería de 12 pulgadas. Hasta el presente, el tubo de 12 pulgadas ha sido el de mayor diámetro usado en los principales sistemas en los Estados Unidos de América. Una gran parte de la línea principal en Plantation está representada por el tubo de 12 pulgadas.

Sobre la base de los precios predominantes al principio de este año, el costo de una línea de 12 pulgadas fué aproximadamente calculado a $22.000 por milla, lo cual es equivalente a más de 44 centavos por barril de capacidad diaria. Una línea de 24 pulgadas, con una capacidad diaria de como 300.000 barriles del mismo petróleo crudo, se ha calculado que no costará más de $60.000 por milla, lo cual equivale a cerca de 20 centavos por barril de capacidad diaria. El costo del transporte de petróleo por un oleoducto de 24 pulgadas es sólo como el 45%, por barril de capacidad, en comparación con el de una línea de 12 pulgadas. En vista del mayor costo del trabajo y del equipo, y teniendo presente la urgente necesidad de que la línea conductora de 24 pulgadas entre Texas e Illinois, quede terminada

Fig. 511

Fig. 516

Fig. 505

Fig. 517

SPANG

CABLE TOOLS

SPANG AND COMPANY
Butler, Pa., U. S. A.

Fig. 526

Fig. 618

Fig. 654

Fig. 671

Fig. 693-A

Fig. 677

Fig. 683

Fig. 620

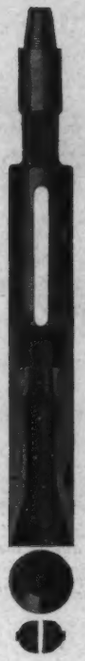


Fig. 706

Fig. 626

Fig. 524

Fig. 511—Spang Weldless Drilling and Fishing Jars . . . forged from one piece of alloy steel.

Fig. 516 & 517—Heat-Treated Pin and Box for Stems and Sinkers.

Fig. 505—Prosser-Type Swivel Rope Socket.

Fig. 526—Standard-Type Straight-Blade, All-Steel Drilling Bit, with heat-treated pins.

Fig. 524—Spang-Type Drilling Bit, Twisted Blade . . . most effective drilling bit available, for all formations. Insures straighter holes, lessens caving.

Fig. 618—Spang Patented Alligator Grab.

Fig. 654—Manila-Rope or Wire-Line Grab, made with either 2 or 3 prongs.

Fig. 671—Spang Eclipse Up-Cutting Wire-Line Knife.

Fig. 693-A—Trip-Casing Spear . . . made in 2, 3 and 4 Slip Types.

Fig. 677—Improved-Type Casing Cutter.

Fig. 683—Spang Patented Reversible Splitter or Ripper.

Fig. 620—Combination Socket.

Fig. 706—Combination Trap Slip Socket, for fishing tubing and rods.

Fig. 626—Full-Circle Three-Slip Socket.

For more than 40 years, Spang Drilling and Fishing Tools have been universally recognized as "Higher Standard" Cable Tools. Their reliability and economy have been proved in the drilling of thousands of the most difficult wells. Today, Spang and Company are the largest exclusive manufacturers of Cable Tools in the world. The Spang line includes the various tools required for all Cable Drilling conditions and for general lease maintenance. Catalog on request.

Fig. 511—Recipientes sin soldadura Spang de perforación y de pesca, forjados de especial aleación de acero de una sola pieza.

Fig. 516 & 517—Espiga y cojinete tratados térmicamente para vástago by dispositivos forzadores.

Fig. 505—Manguito de cable giratorio tipo Prosser.

Fig. 526—Barrena de perforación de tipo Spang, de lámina recta normal, con espigas tratadas termicamente.

Fig. 524—Barrena de perforación de tipo Spang, de lámina en espiral. La broca o barrena más eficaz en el mercado, para todas las formaciones. Asegura agujeros más rectos y reduce los hundimientos.

Fig. 618—Atrapador Alligator Spang patentado.

Fig. 654—Atrapador en cable metálico o de Manila, con 2 o con 3 puntas.

Fig. 671—Cuchilla Eclipse Spang para cortar cable metálico de abajo para rriba.

Fig. 693-A—Harpón de disparo de revestimiento, provisto en tipos de 2, 3 o 4 sujetadores.

Fig. 677—Fresa de revestimiento de tipo perfeccionado.

Fig. 683—Seccionador o rompedor reversible Spang patentado.

Fig. 620—Manguito de combinación.

Fig. 706—Manguito de combinación de sujetador y trampa, para pesar la tubería y varillaje.

Fig. 626—Manguito de tres sujetadores a círculo completo.

Desde hace más de 40 años, las herramientas Spang de perforación y pesca se conocen universalmente como las herramientas de cable "de norma superior". Han demonstrado su eficacia, en seguridad y en economía, en la perforación de millares de pozos de difícil tratamiento. Hoy día, la Spang & Company es la fábrica exclusiva más grande del mundo de herramientas de cable. El surtido Spang comprende todas las herramientas que se requieren para las condiciones más variadas de perforación por cable y de mantenimiento general de explotaciones. Catálog o solicited.

construction organizations led to an extensive adoption of stovepiping. Stovepiping consists of adding one joint at a time to the line instead of adding pipe welded in sections of three or four joints. About half of the laying of this line is done by stovepiping.

Experience demonstrated that sections of the Grade B, 24-in. pipe, with wall thickness of ⅜-in., could be readily cold-bent in the field where the roll-weld method was used. Where stovepiping is used, single joints are bent by heating with a kerosene flame and special equipment customary for this work. Specifications make it possible for contractors to choose a three-bead or a four-bead method of welding.

In the laying of line, the large sizes of tractors became desirable for coating and wrapping operations, as well as for lowering in.

During the early weeks of construction work at the southern end, work was slowed down by rainy weather. The rate of laying pipe increased with the improvement in weather conditions and the efficiency of the crews, or spreads as they are called. The eight spreads finally reached a peak of 9.93 miles a day which is believed to be the fastest rate at which any large-diameter line has been laid.

Four tractors raising 18-in. pipe during the construction of a natural gas line

Quatro tractores levantando tuberia de 18" durante la construcción de un conducto de gas natural

Pressure Welding

An interesting innovation in pipeline construction this year has been the use of pressure welding which does not require the services of experienced welders. For the last 2 years, this process has been going through an experimental stage, during which equipment was being developed which is suitable for the field. After demonstrating what could be done in laying natural-gas lines, the procedure has been employed to a limited extent during the last half of the year in the construction of oil lines. Welding is done by heating the ends of two joints to a temperature which is sufficient to soften steel but not high enough for the steel to flow. After the temperature has been raised to the desired degree, the two joints are pushed together under pressure of about 750 lb. It is claimed that from the completion of one weld to the completion of the next weld, it may take as little as 1½ minutes.

Plow-Type Equipment

Due to the shortage of steel, it has been necessary to use old pipe extensively in new projects this year. Where it is necessary to speed up the work of taking up old pipe, it has been found that the use of plow-type equipment has been effective. One organization makes a practice of using ditchers and plows for this purpose.

In experiments carried on to develop plow-type equipment for breaking ground ahead of a ditcher or for digging the complete ditch, it has been observed that much study needs to be given to design in order to utilize tractor power efficiently. There have been complaints that plow-type equipment re-

este año, será lógico anticipar que el costo final de este proyecto del Gobierno sobrepasará el cálculo preliminar.

Los efectos económicos y técnicos de los proyectos de Plantation y del Gobierno serán seguramente trascendentales, y es posible asumir que representen el comienzo de una nueva era en la construcción de sistemas de oleoductos en los Estados Unidos de América.

Metódos de construcción

En la instalación del oleoducto de 24 pulgadas de Texas a Illinois, se han presentado desarrollos muy interesantes. A pesar de que el método corriente de tender tubería de gran diámetro ha sido, hasta ahora, el colocar una sección de tubos soldados, la experiencia de algunas organizaciones de construcción ha conducido a una creciente adopción de la instalación de tubos independientes. Este nuevo método consiste en tender un tubo, cada vez, en lugar de colocar una sección de tres o cuatro tubos soldados, cada vez. Como la mitad del trabajo de tender tubería se hace ahora por este nuevo método.

La experiencia ha mostrado que las secciones de tubería de clase B de 24 pulgadas, con espesor de pared de ⅜ de pulgada, pueden doblarse facilmente en frío en el campo, cuando se sigue el método de tender secciones soldadas. En el nuevo método de tender independientemente los tubos, éstos se doblan por calentamiento con una llama de petróleo, y hay un equipo especial para hacer este trabajo.

Las características del trabajo permiten a los contratistas la elección de método de soldar de tres o de cuatro pestañas.

Los tractores de tamaños grandes han dado buenos resultados en conexión con los trabajos de forrar y arrollar la tubería, lo mismo que para su bajada y colocación en la zanja.

Durante las primeras semanas del trabajo de construcción, en la región extrema del sur, la obra fué retardada por las lluvias. Con la llegada del tiempo más benigno, se aceleró el trabajo de las cuadrillas. Las ocho cuadrillas de operarios alcanzaron finalmente un máximo de 9,93 millas al día, y se cree que este es el régimen más rápido de tender tubería de gran diámetro que se ha visto hasta ahora.

Soldadura a presion

Una interesante innovación en la construcción de oleoductos este año ha sido el uso de la soldadura a presión, la cual no requiere los servicios de soldadores de experiencia. Durante estos últimos 2 años, este procedimiento ha pasado por un período de experimento, y particular atención se ha dado al desarrollo de un equipo bien adaptado a sus requisitos. Después de demonstrar lo que podía hacer en conexión con el tendido de tubería de gas natural, el nuevo procedimiento fué utilizado, hasta un punto limitado, en la construcción de oleoductos, el segundo semestre de este año. La soldadura se hace calentando los extremos de los dos tubos a una temperatura que es suficiente para ablandar el acero, pero insuficiente para derretirlo. Después de elevada la temperatura al grado conveniente, los dos extremos se juntan y empujan bajo una presión de como 750 libras. Se dice que de la terminación de una soldadura a la de la siguiente, no se ocupa más de un minuto y medio.

Equipo de tipo de arado

Debido a la escasez de acero, ha sido necesario usar mucho la tubería vieja en los nuevos proyectos de este año. Se ha visto que el empleo del equipo de tipo de arado resulta muy efectivo para levantar la tubería vieja. Una importante organización sigue la práctica de usar zanjadoras y arados para hacer este trabajo.

En los experimentos para perfeccionar el equipo de tipo de arado para abrir el terreno adelante de una zanjadora o para excavar la zanja completa, se ha obserbado que debe darse mucho estudio a la construcción del equipo, a fin de utilizar ventajosamente la fuerza del tractor. Han habido quejas de que el equipo de tipo de arado requiere más fuerza de tractor que la necesaria. Los arados para trabajos de tender tubería, que son tirados a remolque, han resultado más satisfactorios que los movidos por empuje. Es muy posible que la adopción de un arado provisto de una articulación flexible de tres puntos y gobierno hidráulico, pueda ofrecer la solución del problema.

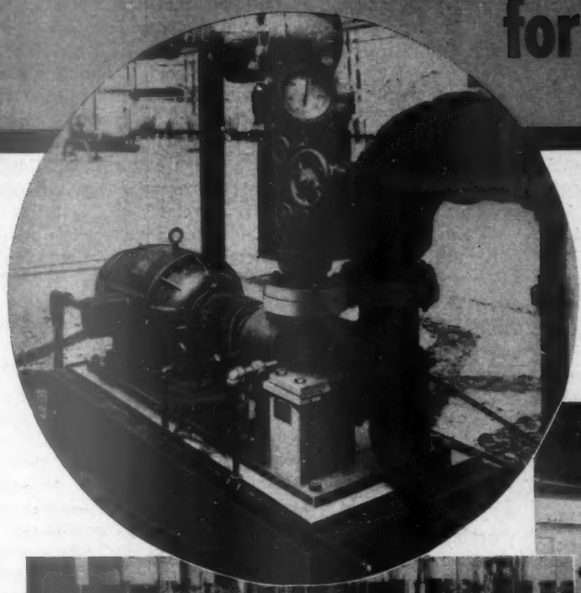
Tuboc colectores de estacion

En la construcción de los sistemas de tubos colectores de las estaciones de bombas se ha demonstrado que hay ventajas en que el trabajo de fabricación se haga en un taller de soldar. De este modo, los sistemas de tubería pueden hacerse de una manera más económica y exacta. Una organización ha visto que los varios pasos del procedimiento de fabricación se facilitan y mejoran mediante el uso de soportes o útiles especiales para el objeto, los cuales aumentan el rendimiento del soldador, lo mismo que la seguridad de las condiciones de trabajo.

Los esfuerzos en un tubo colector grande han sido aliviados soportándolo en uniones de tubo tendidas horizontalmente, que actúan como rodillos, permitiendo movimiento para la dilatación y la contracción. También se usa un gato de tipo especial para soportar el tubo colector, para librarlo de indebidos esfuerzos.

En años recientes, se ha acostumbrado enfriar el agua de la canalización o camisa del motor en un cambiador de temperatura, mediante líquido inyectado por la tubería. Una compañía que construyé estaciones

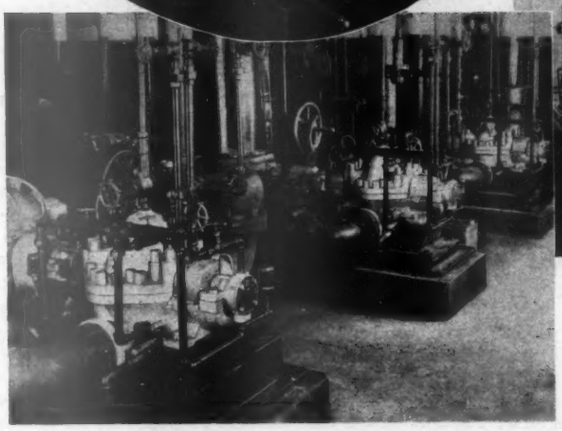
An INGERSOLL-RAND PUMP for Every Refinery Service



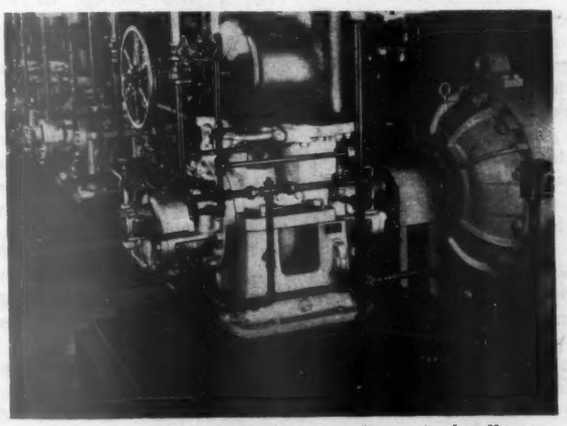
Left—*Single-stage pump serving stabilizers.*

Right—*Three 6-stage lean-oil pumps and two single-stage rich-oil pumps.*

Two 7-stage cracking coil charging pumps.



A battery of single-stage pumps for handling hot distillates.



Two-stage pumps on inter-unit transfer service handling hot bottoms.

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quires more tractor power than is desirable. Pipe-line plows, which are towed, have been more satisfactory than those which are pushed. It is possible that adoption of a plow, equipped with a flexible, three-point linkage and hydraulic control, may offer a solution for the problem.

Station Manifolds

In the construction of manifold systems at pump stations, it has been demonstrated that there are advantages in having fabrication work done at a welding shop. In this way, piping systems can be made more economically and accurately. One organization has found that the various steps in the process of fabrication can be improved by the use of special jigs designed for the purpose which increase the welders' efficiency as well as the safety of working conditions.

Stresses in a large manifold have been relieved by supporting it on joints of pipe laid horizontally which act as rollers, allowing movement with expansion and contraction. A special type of jack is also used for supporting the manifold so as to relieve stresses.

In recent years, it has been customary to cool engine-jacket water in a heat exchanger by fluid pumped through the pipe line. A company building stations for a gathering system within the last year places heat exchangers on racks above the ground where they are accessible and removed from corrosive conditions. The heat exchanger is made in three sections, parallel to each other. In hot summer weather, it is necessary to use all three sections; in the winter, only one is used. At these stations, temperature of water cooling the speed-increaser gears is lowered by passing through an evaporator tower.

Temperature of gear housings, as well as temperature of the interior of station buildings, generally has been lowered satisfactorily where internal-combustion engines are cooled by radiators, through a method of installation which provides for having air pulled through radiators by blowers and expelled outside. The space between the radiator and the opening of the building is enclosed.

Electric Centrifugal Pumps

Electric-driven centrifugal pumps have been widely used on new pipeline projects this year because of the difficulty in obtaining diesel-engine-driven units.

Designers for major gasoline lines have been faced with the problem of providing for changes which can be made economically for handling increased loads.

The Pantation products system was fortunate in making such provision, because, shortly after the line was completed, it was found necessary to increase capacity from 60,000 bbl. to 90,000 bbl. daily. The centrifugal pumps had been made so that impellers could be removed and replaced by impellers of the same design but larger capacity. This could be done without affecting the original mechanical efficiency of the pumps.

The problem was met with the unique development of a double-rated horsepower motor, 600 to 900 hp. for the 12-in. section of the trunk line and 450 to 600 hp. for the 10-in. section. Motors are explosion-resisting induction type, requiring special starting voltage of not less than 92 per cent of the full-load running voltage. When pumping through this line at the rate of 60,000 bbl. per day, fluid moves 5 ft. per second; when pumping 90,000 bbl. per day, fluid moves 7½ ft. per second.

During the period when preliminary work was done on the design of the 24-in. crude-oil line, now under construction northeastward from Texas, difficult problems were encountered in the design of pumps when an effort was made to use the conventional pattern of pipe-line pumps with three or four stages of impellers housed in one casing, each stage capable of generating 250 to 300 ft. of head. Consideration had to be given to passing 7,500 to 8,000 g.p.m. through short curved tubes from one stage to another in the same casing to obtain a balanced thrust on the impeller shaft. This treatment was to avoid excessive friction loss and also to prevent cavitation in the first stages which would greatly reduce the efficiency of the pump.

Difficulties were overcome by offering three single-stage pumps, each capable of developing one-third of the initial pressure; all three units to be operated in series for maximum capacity desired. The over-all guaranteed efficiency possible with this type of design is 5 to 8 per cent greater than could have been assured with impellers housed in one casing.

Automatic Control of Reciprocating Pumps

It is a comparatively simple matter to design an automatically controlled centrifugal pump, whether motor or engine driven. Such equipment is ideal for certain types of service but it cannot be obtained in the United States except for government-sponsored projects.

Considerable attention has been given to automatic control of piston-pattern and plunger-type reciprocating pumps for crude and products-line service. Due to difficulty in obtaining modern suction or discharge control equipment, some companies have resorted to utilizing old gas or pressure regulators, diaphragm valves, etc., for pressure or automatic control. A pressure transfer medium is to be had in the compressed-air or natural-gas pressure which is nearly always available at a pump station. Satisfactory methods of control can be installed which can function without the use of tanks except for the necessary small sump tanks.

para un sistema recolector el año pasado, colocó cambiadores de temperatura en soportes encima del suelo, donde quedan a fácil alcance y al mismo tiempo protegidos contra las condiciones corrosivas. El cambiador de temperatura consta de tres secciones todas paralelas entre sí. En el verano, cuando hace mucho calor, es necesario usar las tres secciones, pero en el invierno se requiere el uso de una sola. En estas estaciones, la temperatura del agua de enfriamiento para el mecanismo de engranajes de velocidad se reduce pasando el agua por una torre de evaporación.

La temperatura de las cajas de engranajes, lo mismo que la temperatura del interior de los edificios de estación, ha sido, por lo general, reducida satisfactoriamente en aquellos casos en que los motores de explosión interna están enfriados por radiadores, pues se establece entonces un método de instalación que comprende el paso del aire por radiadores, inducido por sopladores, y luego su eyección afuera. El espacio entre el radiador y la abertura del edificio está tapado.

Bombas centrífugas eléctricas

Las bombas centrífugas, accionadas por motores eléctricos, se han usado mucho en nuevos proyectos de tubería transportadora este año, a causa de la dificultad que se presenta en la adquisición de grupos accionados por motores diésel.

Los constructores de importantes líneas de tubería de gasolina enfrentan ahora el problema de disponer la instalación de modo que los cambios que más tarde se requieran para el manejo de mayores cargas, puedan hacerse con economía.

El sistema de productos Plantation fué afortunado en incluir semejante posibilidad en su proyecto, pues poco después de terminada su línea de tubería, se presentó la necesidad de aumentar la capacidad de 60.000 a 90.000 barriles diarios. Las bombas centrífugas se hicieron de modo que los impulsores podían quitarse y reemplazarse con impulsores similares en tipo pero de mayor capacidad. Esto pudo realizarse sin alterar el rendimiento mecánico original de las bombas.

El problema fué resuelto con el oportuno desarrollo de un motor de doble potencia, de 600 a 900 cdf. para la sección de 12 pulgadas de la línea principal, y con otro de 450 a 600 cdf. para la sección de 10 pulgadas. Los motores son del tipo asincrónico, resistente a la explosión, que requieren una tensión especial de arranque de no menos de 92% del voltaje de funcionamiento a carga completa. Cuando se activa el movimiento por esta línea a razón de 60.000 barriles al día, el líquido avanza 5 pies por segundo y cuando es a razón de 90.000 barriles al día, la velocidad sube a 7½ pies por segundo.

Durante el período de trabajo preliminar en el proyecto del oleoducto de 24 pulgadas, ahora en construcción por la parte del noroeste de Texas, se presentaron difíciles problemas en lo tocante a los tipos de bombas, cuando se trató de usar los modelos corrientes de bombas de oleoducto, de tres o cuatro grados de aspiración, con los impulsores colocados todos en una caja, y cada uno dispuesto para generar una altura de aspiración de 250 a 300 pies. Se tuvo que dar consideración al paso de 7.500 a 8.000 galones por minuto, por cortos tubos curvos de un grado al otro en la misma caja, para obtener un empuje compensado en el árbol impulsor. Esta disposición iba a evitar la pérdida excesiva por rozamiento y también a impedir la retardación en los primeros grados, cosa que podría reducir grandemente el rendimiento de la bomba.

Las dificultades se subsanaron mediante tres bombas de un solo grado de aspiración, cada una capaz de desarrollar un tercio de la presión inicial, las tres accionándose en serie para obtener la capacidad máxima deseada. El rendimiento total garantizado de este tipo de instalación es de 5 a 8 % más grande que el que podría asegurarse con todos los impulsores dispuestos en una sola caja.

Gobierno automático de las bombas de movimiento alternativo

Es comparativamente fácil construir una bomba centrífuga de gobierno automática, ya tenga propulsión por motor eléctrico, ya por motor de explosión interna. Semejante equipo es ideal para ciertos tipos de servicio, pero no puede obtenerse al presente, excepto para proyectos recomendados por el Gobierno.

Se ha dado mucha atención al gobierno automático de las bombas de movimiento alternativo del tipo de émbolo, para servicio en tubería conductora de petróleo crudo y de sus diversos productos. Debido a la dificultad que se presenta en la obtención de moderno equipo de gobierno de aspiración y descarga, algunas compañías han recurrido a la utilización de antiguos reguladores de gas o de presión, válvulas de diafragma, etc. para el gobierno de la presión o gobierno automatico. Ha de tenerse un medio de transferencia de presión, en la presión del aire comprimido o del gas natural, el cual se encuentra casi siempre disponible en una estación de bombas. Es posible instalar satisfactorios métodos de gobierno, que pueden funcionar sin el uso de tanques o depósitos, excepto los necesarios tanques pequeños de servicio.

Para el buen funcionamiento de las bombas de movimiento alternativo del tipo de émbolo, en el servicio de tubería conductora de butano y gasolina sujeto a gobierno de presión, para la transmisión de una estación a la otra, se ha visto que los coladores o tanques de deposición deben instalarse en la tubería de aspiración a las bombas, para

VITAL war supplies for our Armed Forces are now being turned out daily at our Toledo plant. We are proud to be doing our part. However, our defense activities have not taken skilled sucker rod craftsmen from their job—the job of building the highest quality into JoneSuckeRods. Long before Pearl Harbor our plant and personnel were enlarged to take care of the war goods we now make. Jones die and forging craftsmen, metallurgists, field and laboratory technicians are all working together to make sure that JoneSuckeRods will give the maximum in service and life. In fact, we expect that improvements will come, as they always have, from our uninterrupted plant operations and research.

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VITALES abastecimientos de guerra para nuestras fuerzas armadas se están construyendo a diario en nuestra fábrica en Toledo. Nos sentimos orgullosos de estar haciendo nuestra parte. Sin embargo, nuestras actividades en la producción de material de guerra, no han separado a nuestros habiles artesanos de varillas de bomba de su acostumbrado trabajo de introducir la más alta calidad en las varillas de bomba JoneSuckeRod. Mucho antes del ataque a Pearl Harbor, nuestra fábrica y personal fueron agrandados para encargarse de los productos de guerra que ahora fabricamos. Los expertos en moldes y forjadura de la Jones, lo mismo que sus metalurgos y técnicos de laboratorio y campo, están todos trabajando juntos, para asegurar que las varillas de bomba JoneSuckeRod den lo máximo en servicio y duración. En efecto, anticipamos que resultarán refinamientos, como siempre sucede, del funcionamiento contínuo de nuestra fábrica y estudios de nuestros ingenieros.

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Equipment used for the pressure welding process which utilizes oxyacetylene flames and hydraulic pressure, one of the newer techniques in pipe-line construction

Equipo usado para la soldadura de presión, la cual utiliza las llamas de oxígeno y acetileno y la presión hidráulica, lo cual representa una de las más recientes ténicas en la construcciónde oleoductos

In operating piston-pattern-type reciprocating pumps in butane and gasoline service by pressure control, for station-to-station pumpings, it has been found that strainers or settling tanks must be provided on the suction line to the pumps in order that they function continuously in a satisfactory manner. Safety valves must be provided on the suction line. Suction flanges, suction valve decks, etc., must be designed for more than one-half maximum line pressure, in order to be prepared for station shut down.

Superchargers for Diesel Engines

An innovation of much significance in wartime conditions is the use of superchargers or turbochargers for increasing the output of four-cycle diesel engines. One major pipe line is now completing a program for the extensive installation of such equipment at stations on a section of its trunk line moving crude oil northeastward. Following up success with supercharging four-cycle engines, some consideration is being given to developing superchargers for two-cycle engines. However, a lesser amount of increased output is to be expected because two-cycle engines have certain features of supercharger systems to begin with.

The application of turbochargers to existing engines offers a number of distinctive features. A substantial increase in output can be obtained with a very small increase in weight and generally no increase in otherwise useful space. Sea-level rating can be restored to engines at altitudes of 12,000 and 14,000 ft. When installed on an existing engine, the fuel consumption is changed very little over the original unsupercharged range of output. Operation of turbochargers is fully automatic at all loads and no controls are required. Turbocharged engines have proved to be as reliable as the unsupercharged engines and no additional operating difficulties or maintenance costs are experienced.

Modern Products-Line Equipment

Station equipment on the Plantation line represents the latest developments in design of facilities for products-line service. At each station the pump room is ventilated by air drawn through filters in the front wall and discharged to the piping platform dissipating petroleum vapors which may collect during certain phases of operation. All electric motors, controls, signal devices, motor-operated valves, lighting fixtures and wiring installations are designed for service in atmospheres containing petroleum vapors.

Each pump unit is controlled entirely by an individual "start-stop" push button, the control system providing the proper sequence of starting and shutdown operations. In a typical two-unit booster station, this control system provides automatic means for venting pump casings during shutdown; for permitting the starting of a unit only upon existence of predetermined minimum suction pressure; for operating in correct sequence a motor-driven suction valve and a motor-driven discharge valve for each unit; for venting vapor from the pump casing and circulating liquid through the pump during the starting; for adjusting station capacity to line throughput while the station is on the line; for limiting suction and discharge pressure to that for which the line is designed; for shutting down the station in case of fire; for shutting down the station in case of abnormal suction or discharge pressures; for shutting down the station in case of abnormal motor temperatures; for shutting down the station in case of abnormal liquid level in the pump casing; for shutting down the station in case of failure of air supply; and for shutting down the station in case of abnormal tank level.

Sobrecompresores para motores díesel

Una innovación de mucho significado en nuestro estado de guerra es el uso de sobrecompresores o turbocargadores para aumentar el rendimiento efectivo de los motores diésel de cuatro tiempos. Una importante compañía de oleoductos está ahora completando un programa para la instalación intensa de semejante equipo en estaciones en una sección de su línea principal que transporta petróleo crudo hacia el noroeste. En vista del éxito de la sobrecompresión de los motores de cuatro tiempos, se está ahora tratando de aplicar también sobrecompresores a los motores de dos tiempos. Sin embargo, una menor cantidad de adicional rendimiento es lo que se anticipa, a causa de que los motores de dos tiempos tienen ciertos rasgos propios de sobrecompresión.

La aplicación de turbocompresores o turbocargadores a los motores existentes ofrece un número de ventajas evidentes. Se puede obtener un aumento considerable de rendimiento efectivo con un aumento de peso muy pequeño y generalmente sin ningún aumento de espacio que de otra manera pudiera ser útil. A los motores en altitudes de 12.000 a 14.000 pies se les puede restablecer la fuerza que tenían a nivel del mar. Al instalárse en un motor existente, el consumo de combustible sufre muy poco cambio sobre el que exiguía el motor cuando no tenía sobrecompresor. El funcionamiento de los turbocargadores o sobrecompresores es completamente automática en toda la escala de carga y no necesita gobiernos. Los motores sobrecomprimidos son tan seguros como los motores sin sobrecompresor, y nō provocan ninguna dificultad adicional en funcionamiento o en gastos de conservación.

Equipo moderno para tubería transportadora

El equipo de estación de bombas de la línea de Plantation representa la última palabra en estilo de facilidades para el servicio de tubería transportadora de productos de petróleo. En cada estación, la sala de las bombas está ventilada por aire aspirado a través de filtros en la pared delantera y descargado en la plataforma de tubería, disipando los vapores de petróleo que se acumulan en este punto durante ciertas fases del trabajo. Todos los motores eléctricos, gobiernos, dispositivos de señalización, válvulas accionadas por motor, portalámparas e instalaciones de alambrado, están proyectados para servicio en ambiente que contiene vapores de petróleo.

Cada bomba está gobernada por un botón de presión de "arranque y parada," y el sistema de gobierno regula la correcta consecución de los arranques y paradas. En una típica estación auxiliar de dos bombas, este sistema de gobierno provee un medio automático para la limpieza de las bombas, durante los paros; para permitir el arranque de una de las bombas sólo cuando existe una predeterminada presión mínima de aspiración; para accionar, en correcta consecución una válvula de aspiración y una válvula de descarga movidas a motor, para cada bomba; para expeler el vapor de la caja de la bomba y circular líquido por la bomba durante el arranque; para ajustar la capacidad de la estación a la capacidad de la línea mientras la estación está conectada; para limitar las presiones de aspiración y descarga dentro de una escala de seguridad; para la cesación del trabajo con seguridad, con emisión de alarma tonal y encendido de una luz de señal para indicar irregularidades como la duración excesiva de la corriente del motor de arranque, elevadas temperaturas en los cojinetes del motor y de la bomba, en los prensaestopas de la bomba y en la caja de la bomba; para indicar la presión de aspiración demasiado baja o demasiado alta; para dar alarma cuando está muy caliente el arrollamiento del motor, cuando está muy alto el nivel del tanque y cuando está muy baja la presión del abastecimiento de aire; y para el gobierno de la presión de la estación.

Tanto en las líneas de tubería conductora de petróleo crudo como en las de productos refinados se sigue, por lo general, la práctica de averi-

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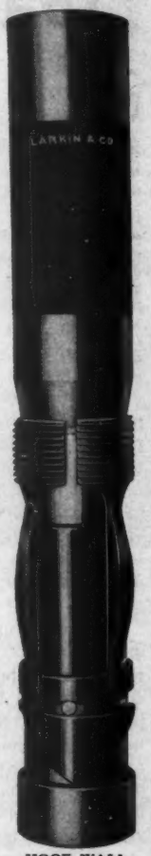

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sures within limits required for safe operation; for safety shutdown with sounding of alarm and turning on a signal light for such cases as excessive duration of high motor-starting current, high temperatures at motor and pump bearings, pump glands and pump casing, low or high-pressure suction pressure; for signaling alarms for high motor-winding temperature, high sump-tank level, and low air-supply pressure; and for station pressure control.

It is generally customary on both crude-oil and refined-products lines to determine the dividing point between shipments by detecting changes in gravity. The method commonly used has been the taking of frequent hydrometer readings of samples in the period when the arrival of a new shipment is expected. Considerable work is now being done on the design and testing of instruments for continuously recording the gravity of fluid passing through a line.

Significant development work is also being done to devise improved types of relief valves for station piping installations.

Conclusion

In conclusion, it may be observed that war conditions have accelerated the development of a number of practices which may have an important effect on future pipe-line policies.

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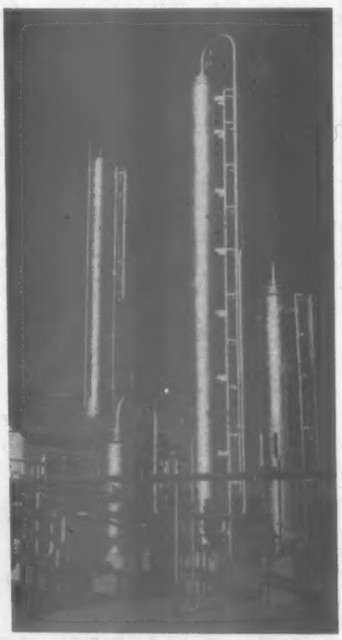
Progress in Natural Gasoline

LIKE all divisions of the petroleum industry, that part which identifies itself with natural-gasoline manufacture has had to revise its normal routine to satisfy a war economy. It has had to make the most drastic change of all. It has had to decide whether it would simply supply natural gasoline to refiners as a contributor to the normal motor-fuel-production program, or do this and also become an important supplier of fractions for the synthesis of aviation fuels, chemicals, and plastics. It has chosen the latter. The year 1942 will mark the time when the natural-gasoline industry became an independent branch of the petroleum family.

Partly through economic necessity and partly the result of foreseeing an expanding market for closely fractionated petroleum hydrocarbons, the industry began to recover and offer on the open market commercial-sized quantities of isopentane, normal pentane, neohexane, normal hexane, mixed heptanes, isooctane, isoheptene, isooctene, and various narrow-range petroleum ethers.

These products were not introduced to the natural-gasoline industry specifically in 1942, for some of them had been available in limited quantities from a few plants for several years, and many plants had made liquefied petroleum gases available for many years. But, 1942 marks the time at which gasoline-plant operators first began to think in terms of recovering byproducts in large volume. This, in turn, is no doubt due to our war effort. The synthesis of 91 and 100-octane aviation motor fuels from refinery and natural gases is likely to expand rather than decline whether we have war or peace within the next 5 years.

The isobutane and isopentane needed in this period will tax the fractionating facilities of every refiner and natural-gasoline manufacturer and as materials and technique liberate a freer use of the isomeriza-



Absorber, diethylene glycol dehydrator and contactor for dehydrator unit at one of the newer plants

Absorbedor, deshidratador de glicol dietileno y contactador para el grupo deshidratador en una de las más recientes plantas

guar el punto de separación entre los embarques, por la determinación de los cambios en densidad. El método corrientemente empleado es tomar frecuentes acusaciones con densímetro de las muestras en el período en que se espera la llegada de un nuevo embarque. Actualmente se está dando mucho estudio a la construcción y ensayo de instrumentos para el registro contínuo de la densidad del flúido que pasa por la línea.

También se está trabajando asiduamente en el sentido de construir tipos más perfeccionados de válvulas de desahogo para las instalaciones de tubería en las estaciones.

Conclusión

En conclusión, se observará que el estado de guerra ha acelerado el desarrollo de un buen número de prácticas, que podrán tener un efecto importante en los futuros métodos de las líneas de tubería.

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Progreso en Gasolina Natural

COMO todas las divisiones de la industria del petróleo, aquella parte que se identifica con la manufactura de gasolina natural ha tenido que revisar su rutina normal para satisfacer una economía de guerra. Ha tenido que hacer el cambio más drástico de todas. Ha tenido que decidir si sencillamente suministraría gasolina natural a los refinadores, como una contribuyente al programa de producción normal de combustible de motor, o si hacer esto y también convertirse en importante abastecedora de fracciones para la síntesis de combustibles de aviación, substancias químicas y materiales plásticos. Ha decidido por lo segundo. El año 1942 señalará la época en que la industria de la gasolina natural se hizo un miembro independiente de la familia del petróleo.

Debido por una parte a la necesidad económica, y por la otra como resultado de presentir un mercado creciente para los hidrocarburos de petróleo muy bien fraccionados, la industria empezó a recuperarse y a ofrecer, en mercado abierto, cantidades en tamaños comerciales, de isopentano, pentano normal, neohexeno, hexano normal, heptanos mezclados, isooctano, isohepteno, isooctено y varios éteres de petróleo.

Estos productos no fueron introducidos a la industria de la gasolina natural especificamente en 1942, pues algunos de ellos se obtuvieron, en cantidades limitadas, de unas pocas plantas, desde hace varios años, y además, muchas plantas, desde hace muchos años, han venido vendiendo gases de petróleo en forma líquida. El año 1942, sin embargo, señala el tiempo en que los dueños de plantas de gasolina empezaron, por primera vez, a pensar en el sentido de recuperar los productos derivados, en grande escala. Esto, sin duda alguna, se debe a nuestros esfuerzos de guerra. La síntesis de los combustibles de motor de aviación de números octano 91 y 100, de los gases de refinería y naturales, está destinada a aumentar, más bien que a disminuir, ya tengamos guerra, ya paz, dentro de los próximos 5 años.

El isobutano y el isopentano, que se necesitan en este período, impondrán una demanda extraordinaria sobre las facilidades de fraccionación de toda refinería y de todo fabricante de gasolina natural, y cuando el conocimiento técnico permita una isomerización más expedita del butano y de las fracciones más volátiles del petróleo, para hacer caucho sintético y combustibles de motor de alto número octano, la planta de gasolina natural recibirá la primera llamada por materiales.

De igual manera, a medida que se ensanche la producción de productos químicos del petróleo, para incluir los centenares de hidrocarburos disolventes que se encuentran presentes en la mezcla de petróleo, gas natural y más en particular, en las fracciones líquidas volátiles de la planta de gasolina natural, la demanda de semejantes materiales, como carga preferida, por parte de los fabricantes de productos químicos, constituirá un gran actividad.

Bueno será anotar aquí, sin embargo, que la competencia entre las industrias del gas natural, gasolina natural, refinería, alcohol de grano y derivados del coque, ansiosas de abastecer el limitado mercado de estos productos químicos del petróleo, será muy grande, y que la industria de la gasolina natural no podrá descanzar sobre sus brillantes triunfos pasados si pretende mantener su relativa importancia actual.

Superfraccionación

Para acentuar su importancia en este campo, la industria sólo necesita pasar revista a su trabajo el año pasado. En esta revista, la industria podrá ver que ha construido plantas que son mucho más grandes que las ordinarias de gasolina construidas hace 10 años. Sus nuevas instalaciones están preparadas para la su-

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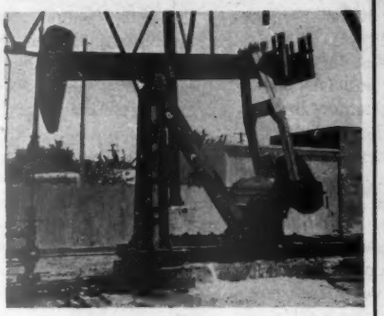

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tion of butane and higher light petroleum fractions to make synthetic rubber and high octane motor fuels, the natural-gasoline plant will receive the first call for materials.

Similarly, as the production of petroleum chemicals is expanded to include the hundreds of hydrocarbon solvents present in the petroleum mixture, natural gas, and more particularly the liquefied light fractions of the natural-gasoline plant will become the chosen charging stock of these chemical plants.

It should be mentioned here, however, that competition among the natural-gas, natural-gasoline, refining, grain-alcohol and byproduct-coke industries wishing to supply the limited market for these petroleum chemicals will be very keen and natural gasoline cannot expect to rest on its early accomplishments if it is to hold its present relative position.

Superfractionation

To further its standing in this field, the industry needs only to review its work of the past year. In this review, the industry can report building plants which dwarf the ordinary gasoline plant of 10 years ago. Its new plants provide for superfractionation and as standard procuts, the new plant will offer a deethanized, depropanized and debutanized natural gasoline, if it is desired, or it might go on so far as to offer several grades of natural gasoline, normal butane and isobutane. The latter separation is accomplished in what the industry has chosen to call a "butane splitter."

Naturally, this separation requires a tower of many plates and the control of temperature and pressure must be held within abnormally close range. Normal butane, it will be recalled, boils at 31.1° F., while the isobutane boils at 10° F., leaving only a 21° range of difference for separation. Because each is completely soluble in the other, their separation is more difficult than this range of boiling points suggests.

For the present, isobutane enjoys a much more active market than the normal butane because the former is more active chemically and can be used directly in alkylation with butylene to make commercial isooctane.

Absorption at High Pressures

One of the primary reasons for the successful recovery of increasing quantities of isobutane, butane, propane, etc., for use in later processing work is the absorption of these from the natural gas at relatively high pressures. In the more recently constructed plants, absorption pressures in the range of 300 to 800 lb. per sq. in. are customary in contrast with the 30 to 70 lb. per sq. in. range generally observed 15 years ago.

Several plants in the Middle West and Gulf Coast are operating at 750 lb. per sq. in. back pressure on the absorber and maintain a temperature inside the tower of 90° F. Because of the gas coming to the absorber in such concentrated volume it was necessary to equalize the accumulation of heat resulting from absorption of the gas in the liquid. This is to be accomplished by removing a portion of the liquid accumulated on a tray located at the appropriate place in the tower, and cooling it outside the tower and then returning it to the tower on the next tower plate. Some absorbers require several of these "intercoolers."

The extended use of this principle could produce almost any reasonable tower condition throughout the column, but here it is used only on a few trays.

Fat-Oil Stabilizer

This tendency to recover a greater volume of light fractions in the absorption oil naturally causes the effect of including abnormally low-molecular-weight gases to be absorbed in the oil also. These would include methane, ethane, and some propane which might not be desirable so a "fat-oil stabilizer" is sometimes included in the modern absorption-distillation system.

The stabilizer operates as a combination surge tank and preheater for the still. The quantity of heat received here is relatively small but is enough to release the very lightest and undesirable gases dissolved in the rich oil. This, in effect, relieves the main still of this duty and thereby conditions for separating the light condensate from the absorption oil are stabilized and improved.

The heating of the oil is carried out in the base of the stabilizer, a steam coil of sufficient size supplying the heat. The ascending heated vapors help to liberate any other undesirable light fractions throughout the column. The height of the stabilizer allows the recovery of a substantial quantity of methane, ethane, and some propane as permanent gases for use in the plant fuel system, but most important, the main still and separator is relieved of this duty.

Balance Steam Requirements

The quantity of steam used in the newer gasoline plants is substantially less per barrel of natural gasoline recovered. Greatest care is taken in designing these plants to balance the steam-generating facilities against the process-steam requirements and any power needed to drive pumps over and above process-steam requirements generally comes to the site in the form of electricity. This condition is watched especially closely in those locations where

perfraccionación, y como productos corrientes, ofrecen una gasolina natural desetanizada despropanizada y desbutanizada, si se desea, a puede ir hasta el punto de ofrecer varias clases de gasolina natural, butano e isobutano normales. Esta última separación se efectúa en lo que la industria ha decidido llamar "separador de butano."

Naturalmente, esta separación requiere una torre de muchas placas y el gobierno de la temperatura y presión ha de mantenerse dentro de una escala anormalmente exacta. El butano normal, como se sabe, ebulle a 31,1° F., mientras que el isobutano hierve a 10° F., quedando una escala de sólo 21 grados de diferencia para la separación. A causa de que el uno es completamente soluble en el otro, su separación se hace más difícil que lo que podría sugerir esta escala de puntos de ebullición.

Por el momento, el isobutano goza de un mercado más activo que el butano normal, a causa de que es más activo quimicamente y puede usarse directamente la alquilatación con butileno, para hacer isooctano comercial.

Absorción a altas presiones

Una de las razones principales de la satisfactoria recuperación de crecientes cantidades de isobutano, butano, propano, etc., para uso en trabajo de conversión más tarde, es la absorción de estos productos del gas natural a presiones relativamente altas. En las plantas de más reciente construcción, las presiones de absorción en la escala de 300 a 800 libras por pulgada cuadrada, son corrientes, en comparación con las de 30 a 70 generalmente aplicadas hace 15 años.

Varias plantas en el oeste central y la Costa del Golfo están funcionando con una contrapresión de 750 libras en el absorbedor y mantienen una temperatura dentro de la torre, de 90° F. A causa de que el gas que entra en el absorbedor viene en volumen muy concentrado, se hizo necesario compensar la acumulación de calor que resulta de la absorción del gas en el líquido. Esto se efectúa quitando una porción del líquido acumulado en una bandeja colocada en el punto a propósito en la torre, y enfriándolo afuera de la torre y luego devolviéndolo a la torre en la placa siguiente. Algunos absorbedores necesitan varios de estos enfriadores auxiliares.

El uso extendido de este principio podría producir casi cualquier condición racional de torre, en toda la columna, pero aquí se usa sólo e unas pocas bandejas.

Estabilizador de petróleo grasoso

Este tendencia a recuperar un mayor volumen de fracciones volátiles en el petróleo de absorción, causa naturalmente el efecto de incluir gases de peso molecular anormalmente bajo, que han también de absorberse en el petróleo. En ellos se comprenden metano, etano y algún propano, los cuales no serian convenientes, y por esta razón se incluye un "estabilizador de petróleo grasoso" en el moderno sistema de absorción y destilación.

El estabilizador funciona como una combinación de tanque de agitación y precalentador para el alambique. La cantidad de calor recibida aquí es relativamente pequeña, pero es suficiente para desprender los gases más livianos e inconvenientes disueltos en el petróleo espeso. Esto, en efecto, libra al alambique principal de este trabajo y sirve de preparación para la separación del condensado liviano del petróleo de absorción.

El calentamiento del petróleo se lleva a cabo en el fondo o base del estabilizador, y un alambique de tamaño suficiente suministra el calor. Los vapores calentados ascendentes ayudan a desprender cualquiera otra de las fracciones livianas inconvenientes que hayan en la columna. La altura del estabilizador permite la recuperación de una buena cantidad de metano, etano, y algún propano, como gases permanentes para uso en el sistema del combustible de la planta, pero lo que es muy importante, el alambique principal y separador quedan libre de esta obligación.

Requisitos de vapor

La cantidad de vapor usada en la nuevas plantas de gasolina es ahora mucho menor por barril de gasolina natural recuperada. Se da sumo cuidado al proyecto y construcción de estas plantas, a fin de compensar las facilidades generadoras de vapor, en relación con los requisitos de vapor de procedimiento, y por esta razón, cualquier fuerza que se necesite para accionar las bombas, que exceda los requisitos de vapor de procedimiento, llega al punto en la forma de electricidad. Esta condición es observada con cuidado, especialmente en aquellos lugares en que el agua es escasa. En algunas de las plantas más nuevas, se instala un equipo de condensación que condensa todo el vapor de procedimiento, casi suprimiendo así la necesidad de agua, exceptuando la que se requiere para compensar la consumida o perdida. Esta agua de compensación se trata con mucho cuidado.

Plantas en la costa del Golfo

Todo lo contrario a escasez de agua se presenta en nueve nuevas plantas de gasolina construidas a lo largo de la Costa del Golfo. En esta región, hay generalmente abundancia de agua. En unos pocos casos, el agua de enfriamiento no es siquiera inyectada a las torres, dependiendo de la clase de agua disponible. Las nuevas plantas de gasolina construidas en la Costa del Golfo se combinan, a menudo, con trabajos de conservación de presión

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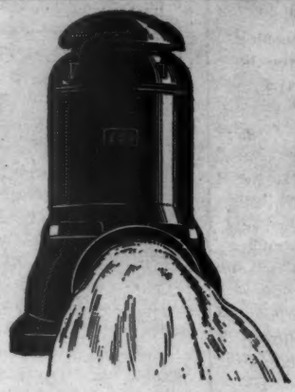

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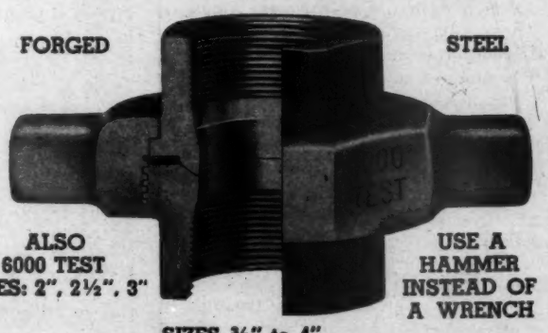

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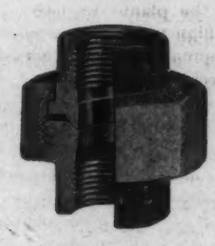

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water is scarce. In some of the newer plants, condensing equipment is installed which condenses all of the process-steam thereby practically eliminating any need for water except for makeup. This makeup water is very carefully treated.

Gulf Coast Plants

The direct opposite of short-water conditions are obtained in nine new gasoline plants built along the Gulf Coast. Here, water is sometimes plentiful. Cooling water is not even pumped over towers in a few instances, depending upon the hardness of the water available. In the Gulf Coast area the new gasoline plants are often combined with pressure-maintenance or repressuring operations. These operations are also often associated with distillate recovery or "cycling plants" and in a few instances the operations are concerned with supplying chemical plants with the right kind of noncondensed petroleum gases.

Operating conditions in these distillate-recovery plants are often quite different from those in the conventional natural-gasoline plants. Initial absorption is usually carried out at 1,800 to 2,000 lb. pressure so that the residual gas can be picked up by the gas-injection compressors at as high a pressure as possible. The rich oil from these high-pressure absorbers is then stage-flashed down to the operating pressure of the still and rectifier. Reabsorbers are frequently employed on the flash gases from these stage separators. The remainder of the distillation equipment is approximately the same as that in an ordinary natural-gasoline plant. Some of the newer distillate-recovery plants employ still generating systems operating in the neighborhood of 700 lb. This steam, after flashing through high-pressure turbogenerators, is then used for process steam throughout the plant. In order to obtain the high temperatures necessary for stripping the absorption oil of the desirable hydrocarbons, direct-fire heaters are employed. The absorption oil entering the still is usually maintained in the vicinity of 500° F.

Without question, petroleum gases as made available from gasoline plants are strong competitors of the still gases manufactured at refineries, the latter the result of cracking. Just what field each will take in the program of developing large-scale production of materials from petroleum by means of "petroleum chemistry," time alone can say.

A major step was taken in the past year along the Gulf Coast in suggesting that natural-gasoline plants will supply most of the charging stock for the manufacture of light chemicals such as alcohols, glycols, acetates, etc., while refinery gases will be utilized in making butadiene for synthetic rubber and toluene for trinitrotoluene. Much of the toluene now being produced is derived from the distillate of distillate-recovery plants.

Number of Plants

Technological and engineering changes are influencing not only the design and operation of existing plants, but are greatly affecting the number, location, and types of operating plants. Over a period of years, the number of operating plants has been greatly reduced, but the combined capacity of the remaining plants has consistently risen. For example, at present there are approximately 600 plants operating compared with about 1,200 at this time in 1928. However, the operating capacity today is 11,400,000 gal. daily compared with 8,800,000 gal. capacity in 1928. Similarly, the number of products of natural-gasoline plants has increased with time and the age-old effect of eliminating the uneconomic units as the manufacturing procedure becomes more complicated, is being experienced.

Liquefied Gases

In the past year the natural-gasoline industry has had to digest more conflicting changes in the operations of its affiliates than any among the petroleum group. One of the most seriously affected affiliates is the liquefied-petroleum-gas industry. Here, over a period of about 8 years, the natural-gasoline industry has perfected the recovery, distribution, and sale of large quantities of liquefied propane and butane as a fuel. Many thousands of dollars were expended in developing strong, safe, metal containers and connections which would not readily corrode and which could withstand internal pressure as well as repeated trips between the recovery plant and the consumer.

Without exception, high-grade steel was consumed in the fabrication of these facilities but when such materials became needed in the war industries, the supplies were withdrawn from the liquefied-gas industry. This move, together with the transportation difficulties, practically stopped the industry from making new installations, especially in the East, and this and other factors caused the household consumption of liquefied petroleum gases to fall off gradually.

But, despite the damaging blows dealt through loss of new equipment, the new industry sold large quantities of household fuel and promised to greatly expand its sales of commercial propane, normal butane and isobutane in coming months. More and more of these materials will be needed to fill the country's program of developing a large output of 100-octane aviation gasoline, toluene and butadiene and this will be especially favorable to the natural-gasoline industry if metals are made available to refiners to convert butane to isobutane by isomerization. At this time the natural-gasoline industry could supply much more butane for the manufacture of war products than is being used. This also would impose curtailment upon the use of liquefied petroleum gas as fuel.

o de regeneración. Estas operaciones se asocian también, a menudo, a plantas de recuperación de destilados, y en algunos pocos casos, los trabajos se dedican a suministrar adecuados gases de petróleo no condensados a fábricas de productos químicos.

Las condiciones de operación en estas plantas de recuperación de destilado son, a menudo, muy diferentes de las existentes en las plantas corrientes de gasolina natural. La absorción inicial se hace generalmente a una presión de 1800 a 2000 libras, de modo que los gases remanentes o residuales pueden recogerse por los compresores de inyección de gas a la presión más alta posible. El petróleo denso de estos absorbedores de alta presión es gradualmente calentado a la presión de trabajo del alambique y rectificador. Con frecuencia se emplean reabsorbedores para los gases que salen de estos separadores graduales. Lo restante del equipo de destilación es casi igual al de una planta ordinaria de gasolina natural. Algunas de las más recientes plantas de recuperación de destilado emplean todavía sistema generadores que funcionan a más o menos 700 libras. Este vapor, después de calentarse al pasar por turbogeneradores de alta presión, se usa como vapor de procedimiento en toda la planta. Para obtener las altas temperaturas necesarias para separar del petróleo de absorción los hidrocarburos inconvenientes, se emplean calentadores de llama directa. El petróleo de absorción que entra el alambique se mantiene generalmente a una temperatura de como 500° F.

Indudablemente, los gases de petróleo provenientes de las plantas de gasolina son grandes competidores de las gases de alambique fabricados en las refinerías y que resultan de la desintegración. Sólo el tiempo determinará qué campo ocupará cada uno en el programa del desarrollo de la producción de materiales de petróleo, en grande escala, con la ayuda de la "quimica petrolera."

Un paso importante se dió el año pasado en la Costa del Golfo cuando se recomendó que las plantas de gasolina natural suministran casi todo el material de carga para la manufactura de substancias químicas livianas, como son los alcoholes, glicoles, acetatos, etc., dejando que los gases provenientes de las refinerías se utilicen en la producción de butadieno para caucho sintético y de tolueno para trinitrotolueno. Mucho del tolueno producido al presente se deriva del destilado de las plantas de recuperación de destilado.

Número de plantas

Los cambios tecnológicos y de ingeniería están ejerciendo su influencia no sólo en la construcción y funcionamiento de las plantas existentes, sino que están afectando también el número, ubicación y tipos de plantas de trabajo. Durante un período de años, el número de plantas de trabajo se ha reducido considerablemente, pero la capacidad combinada de las restantes ha crecido continuamente. Por ejemplo, al presente hay como 600 plantas activas, en comparación con cerca de 1200 en esta época en 1928. Sin embargo, la capacidad de trabajo hoy día es de 11.400.000 galones diarios, en comparación con 8.800.000 en 1928. De igual manera, el número de productos de las plantas de gasolina natural ha aumentado con el tiempo y se está experimentando el antiguo efecto de eliminar las unidades no económicas tan pronto como se presentan más complicados los procedimientos de manufactura.

Gases en forma líquida

Durante el año pasado, la industria de la gasolina natural ha tenido que digerir más cambios contradictorios en las operaciones de sus afiliadas que toda otra dependencia de la industria del petróleo. Una de las afiliadas más seriamente afectadas es la industria del gas de petróleo en forma líquida. Aquí, durante un período de más de ocho años, la industria de la gasolina natural ha perfeccionado la recuperación, distribución y venta de grandes cantidades de propano y butano en forma líquida, para los fines de combustible. Muchos miles de dólares se gastaron en perfeccionar envases metálicos seguros y durables, lo mismo que conexiones resistentes a la corrosión y a la presión interna, que podían aguantar muy bien los repetidos viajes entre la planta de recuperación y el consumidor.

Sin excepción, se consumía acero de superior calidad en la fabricación de estas facilidades, pero cuando semejantes materiales so hicieron indispensables para las industrias de guerra, los abastecimientos se suspendieron a la industria del gas líquido. Este acontecimiento junto con las dificultades de transporte, casi obligaron a la industria a no hacer nuevas instalaciones, particularmente en los estados del este, y éste y otros factores causaron un decaimiento gradual del consumo de gases de petróleo en forma líquida.

Sin embargo, a pasar del serio golpe sufrido a causa de la pérdida del nuevo equipo, la naciente industria vendió grandes cantidades de combustible para casas y prometía aumentar considerablemente sus ventas de propano comercial, butano normal e isobutano en los meses siguientes. Más y más de estos materiales se necesitarán para la realización del programa nacional de desarrollar un gran rendimiento de gasolina de aviación de octano 100, tolueno y butadieno, y esto será especialmente favorable para la industria de la gasolina natural si a la disposición de los refinadores hay metales para convertir el butano en isobutano por polimerización. Al presente, la industria de la gasolina natural podría suministrar mucho más butano para la manufactura de productos de guerra que la que se está usando. Esto, por su parte, impondría una limitación sobre el uso del gas de petróleo en forma líquida como combustible para casas.

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•

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Built to quality, not to price, Emsco Slush Pumps have proven superior. Their all-steel construction and simplified design give them greater strength, less weight, increased horsepower capacity, higher efficiency, and greater operating economy . . . For complete, detailed information, write for illustrated bulletin No. 167-E on the size pump required.

Construidas con énfasis en calidad y no al precio, las Bombas de Inyección "Emsco" han sido comprobados superiores. Su construcción, enteramente de acero, y su diseño sencillo les dan mayor resistencia, menos peso, capacidad aumentada de caballo de fuerza, eficiencia más alta y operación más económica . . . Para recibir completos informes detallados, solicítese el Boletín ilustrado No. 167-E que trata del tamaño de bomba requerida.

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Refinery IDEAS

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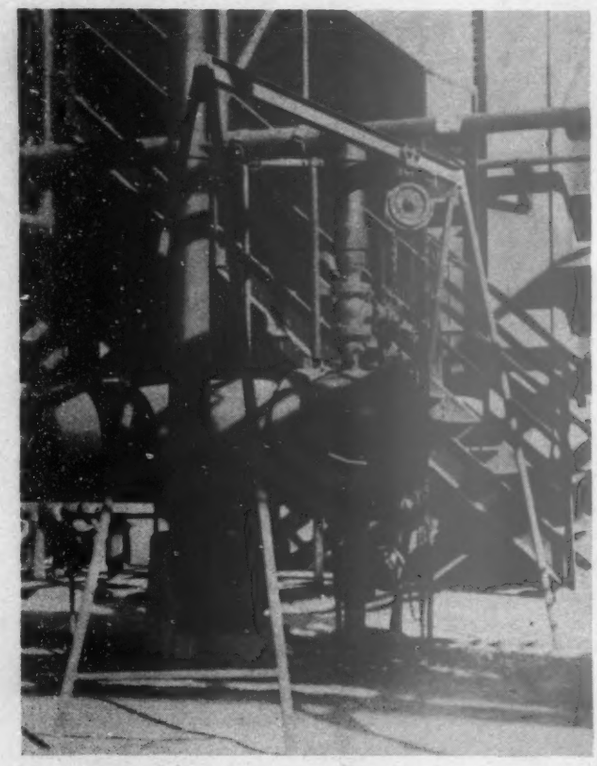
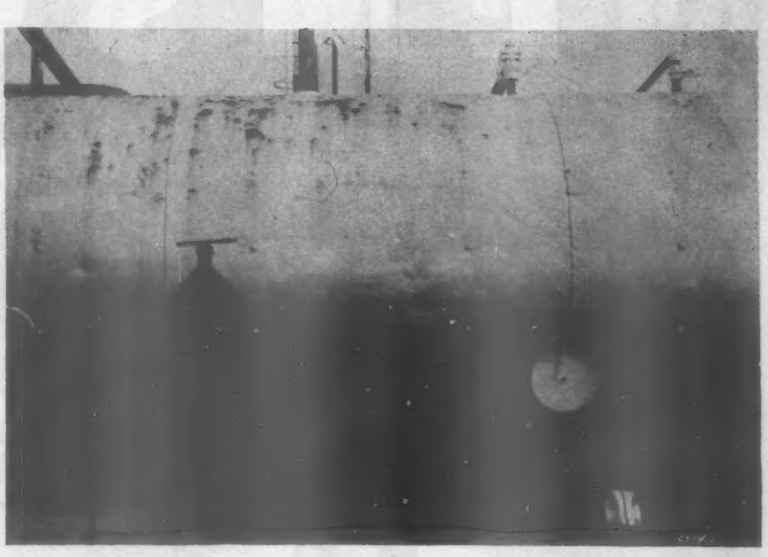


Portable Trolley Beam Has Varied Uses

This four-piece, portable trolley beam consists of a 4-in. I-beam mounted on two A-frames, each made from 2-in. pipe approximately 8 ft. long. Guide bars have been welded to the ends of the I-beam making sockets to hold the formed ends of the two A-frames. Pipefitters use the assembly to handle exchanger heads and large valves under repair. Machinists find it useful in repairing pumps and compressors while the welding department finds the assembly indispensable in handling and holding in position large pieces of equipment which go into the prefabrication of complete units. All of the equipment shown here usually can be salvaged from refinery scrap and can handle with ease, loads of up to a ton or less at any position of the traveling block.

Odorizing Injector For Refinery Gas Line

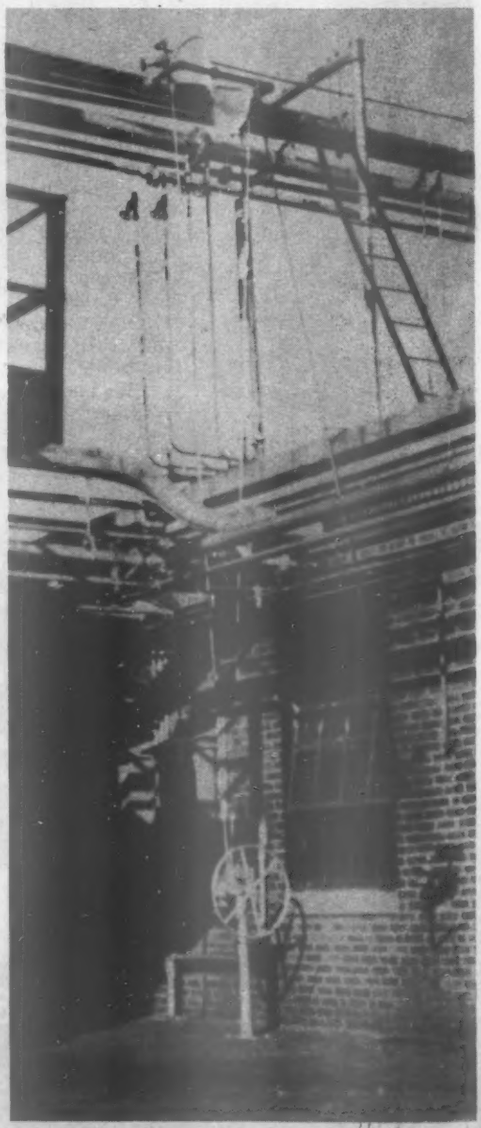
• Residue gas from a vapor-recovery system in a Texas refinery is sold to a gas-distributing company for domestic consumption. It was necessary to odorize the gas so an odorizing injector of "home" design and construction



was provided. The chemical chamber was made from a piece of 10-in. pipe, drawn together at the ends in the shape of a melon, and fitted with an outlet injector-feed line on the bottom and a filling plug on top. The container holds enough chemicals to operate 10 days.

Remote Control On Stop Cocks

The locating of stop cocks in overhead lines is often advantageous except for the need for the operator to climb a ladder from the ground level. This has been eliminated successfully at one plant by installing a cable-actuated system, similar to the rudder control used on a boat. This picture shows the overhead lines and the two arms of the cable leading from the double-quadrant to the 3-in. cable drum mounted in the hand-operated assembly on the ground level. The double quadrant, of course, contains two grooves in which the cable travels. This part of the assembly is mounted on the valve so that its center slips over the valve stem and replaces the regular valve handle. The large wheel shown below has a 3-in. diameter cable drum and the line leading to the drum contains a turnbuckle which can be used to tighten or loosen the cable. The cable has been mounted so that a clockwise turn of the lower wheel will open the cock and a counter clockwise movement will close it. The lower assembly is firmly held and supported by the metal post set in concrete.



QUESTIONS ON TECHNOLOGY

By W. L. NELSON, Technical Editor

Fundamentals of Salt Separator Design

Our plant men do not agree on how to build a salt settler for our crude oil and we would like to have your idea of a salt settler.—D. R. H.

Controversy arises in connection with salt settler design most often because of the shape and arrangement of existing equipment, rather than by argument over the fundamentals of settler design. Some of the theoretical features of a satisfactory settler system and its operation are:

1. Vaporization is harmful because it tends to stir the contents of the settler vessel and because it may cause water to vaporize. The latter is particularly harmful because it leaves solid salt behind as exceedingly fine crystals suspended throughout the oil. These small crystals do not settle and are therefore deposited at subsequent hot zones in the processing system, such as the pipe-still tubes, at which vaporization of the oil takes place.

2. The addition of hot water (same temperature as the oil) often assists in salt removal because it dilutes the brine. Thus, the final settled oil may contain the same amount of b.s. and w. as when fresh water is not added, but the total salt left in the crude oil will usually be somewhat lower if fresh water is used. Care should be taken that the fresh water is intimately mixed with the oil but not to such a degree as to produce additional emulsification. This requires great care in the mixing operation and plant studies of the results of various degrees of mixing.

3. Coagulation of the droplets of brine to larger sized droplets that can settle rapidly is the primary function of a settler. This is accomplished in most settlers by washing the incoming oil through a layer of brine or water in the bottom of the settler, or by passing the oil through beds of crushed stone, clay, excelsior, hay, etc. The beds of packing give trouble by becoming plugged but if replaced at frequent intervals they are of great assistance.

4. Temperatures above 200° F. are of little value unless the crude oil is extremely viscous. In any event, the pressure must be sufficiently high, for the temperature used, to suppress vaporization. If such a pressure cannot be maintained a preliminary vaporizer should be provided, although such a practice is bad because of the vaporization of water that may occur. If pressure cannot be maintained in subsequent process equipment such as exchangers, then two pumps can be used; one for high pressure into the settlers and the other taking out of a lower pressure vaporizer following the settlers.

5. Heating coils, if such must be used in the settlers, should be placed near the upper or outlet parts of the settlers so that convection currents or stirring of the contents will not occur.

6. Time (or rate of flow) through the settlers is perhaps a primary consideration in settler design. Times of 1½ to 2 hours in the settler are advisable. In addition, however, the path of flow should be at right angles to the largest cross-sectional area; such as a horizontal rather than a vertical arrangement of a cylindrical vessel.

7. Treating agents, of which there are numerous types and which are available through a number of companies or chemical manufacturing houses, are effective but it is usually necessary to examine the effect of a number of agents on the oil before a successful treating agent can be adopted.

Define Octane Number and Discuss

Will you be kind enough to send a definition of "octane"? Quite an argument has arisen. We have several technical definitions but we want a definition for the laymen.—H. G. C.

Some terms are so complicated that their definitions must be technical ones. An attempt to simplify the definition for laymen often becomes misleading, giving only a glimpse of the full meaning—and an attempt to completely define the term leads to a long discussion. Octane number is such a term.

Formally (or technically) "octane number is the percentage by liquid volume of isooctane (2,2,4-trimethylpentane) that must be mixed with normal heptane to produce a test fuel which, when used under specified engine conditions will match (or duplicate) the knock intensity of the unknown fuel." This amounts to operating a test engine on the fuel under specified conditions and then operating the engine on several mixtures of the above-mentioned hydrocarbons until a mixture is found which knocks with the same intensity in the engine as the fuel being tested. The hydrocarbon 2,2,4-trimethylpentane (isooctane) has an octane number of 100, heptane has a number of zero, and all mixtures range between 0 and 100.

Definitions which attempt to indicate the usefulness of octane number may be misleading, because there could be many of these and each one of them would lay emphasis upon one particular service or operation and would neglect most others. The least suitable motor fuels have octane numbers of about 40, regular motor fuels range from 60 to 70 in octane number, and premium fuels may range in octane number from 76 to 87. For special engines such as aircraft engines, the octane numbers are high; the U. S. Government specifications now being 73, 91, and 100 octane number.

According to the above definition and test method, a fuel which knocks less violently than isooctane cannot be rated according to octane number, but such fuels (octane number over 100) must be evaluated in some manner. Two methods of stating the knock characteristics of such fuels are in use. In one of these, the high-octane fuel is mixed with a known low-octane fuel and the octane number of the mixture is determined. Thus, if a half-and-half mixture of a 75 octane-number fuel and a high-octane fuel, has an octane number of 100 for the mixture when tested in the engine, the high-octane fuel behaves as if it had an octane number of 125, and it is said to have a blending octane number of 125. This computation was discussed on Page 61 of The Oil and Gas Journal of June 19, 1941. The other way of describing the knock characteristics of high-octane fuel (over 100 octane number) is to compare it in engine tests with 100 octane-number test fuel to which has been added tetraethyl lead. Thus, the 125 blending octane-number fuel referred to above might also be described as equivalent to a fuel of 100 octane number containing say 5 cc. of tetraethyl lead. The latter method is probably not very satisfactory because the engine test procedures now in use do not employ operating conditions which fully utilize the high-energy content of very high octane-number (over 100 octane number) fuels.

Properly built engines can develop more and more power as the octane number of the fuel is increased. Thus, an engine built for and operating on a 100 octane-number fuel will develop 35-50 per cent more power without knocking than an engine built for and operating on a low-octane number fuel. However, at a blending octane number of 125, a fuel will not knock under any type of operation in present engines.

Isobutane—Specifications

Will you please tell us what specifications we will have to meet in marketing isobutane?—J. G.

Official specifications for isobutane do not appear to have been adopted by any organizations. Purchases are usually made on a basis of isobutane content, most buyers prefering concentrations of 50 per cent or more of isomers. Some volume of material is sold as an isobutane concentrate running 80 to 85 per cent isobutane. "Technical Isobutane" is considered to contain 90 per cent of isobutane and so-called "commercial isobutane" usually contains in excess of 95 per cent isomers. The impurities in these materials are primarily normal butane.

Some contract sales of isobutane are said to have been based on the regular Natural Gasoline Association of America specifications for commercial butane having added a single sentence which states the isobutane content. Except for the difference in the vapor pressure of isobutane (73.5) from that of normal butane (52) it would seem that such a specification would be satisfactory. As an indication of such a practice, a suggested specification for isobutane is given below.

Isobutane materials shall be hydrocarbon products composed predominantly of isobutane and/or isobutylenes but the purchaser may designate the percentage of isobutane in the product according to one of the following requirements:

Technical isobutane—over 90 per cent and/or isobutylene.

Commercial isobutane—over 95 per cent and/or isobutylene.

Isobutane concentrate—over 80 per cent isobutane and/or isobutylene.

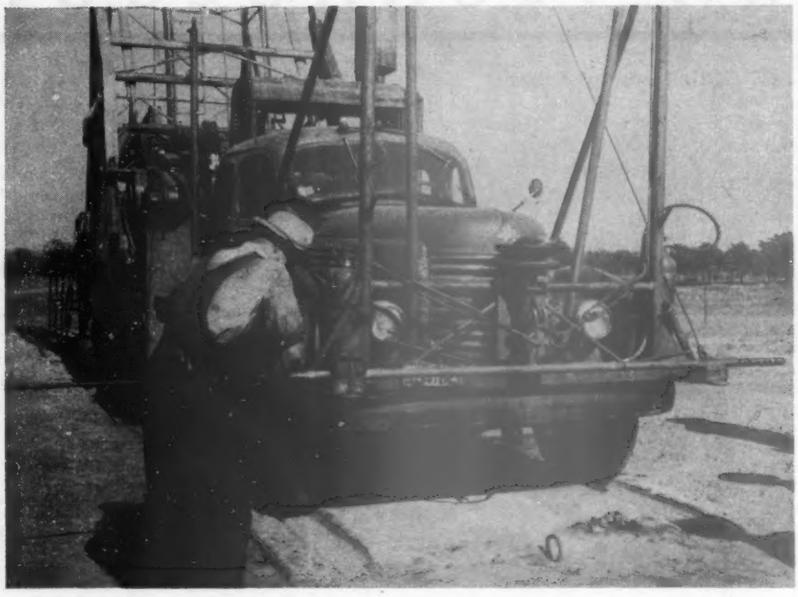
Vapor pressure.—The vapor pressure at 115° F. as determined by the Liquid Petroleum Gas Vapor Pressure Method, shall not be in excess of 85 lb. per sq. in. gage pressure.

Ninety-five per cent Boiling Point.—The quantity evaporated at a temperature of 34° F., corrected to a barometric pressure of 740 mm. Hg., shall be 95 per cent by volume, as determined by the Open Cylinder Weathering Test.

Sulfur Content.—The product shall be free from hydrogen sulfide and shall not contain mercaptans, or other sulfur compounds, of a corrosive nature. The unstenched product, shall not contain total sulfur in excess of 15 grains per 100 cu. ft. of vapor as determined by the test for Total Sulfur in Liquefied Petroleum Gases.

Water Content.—The product shall be free of mechanically entrained water.

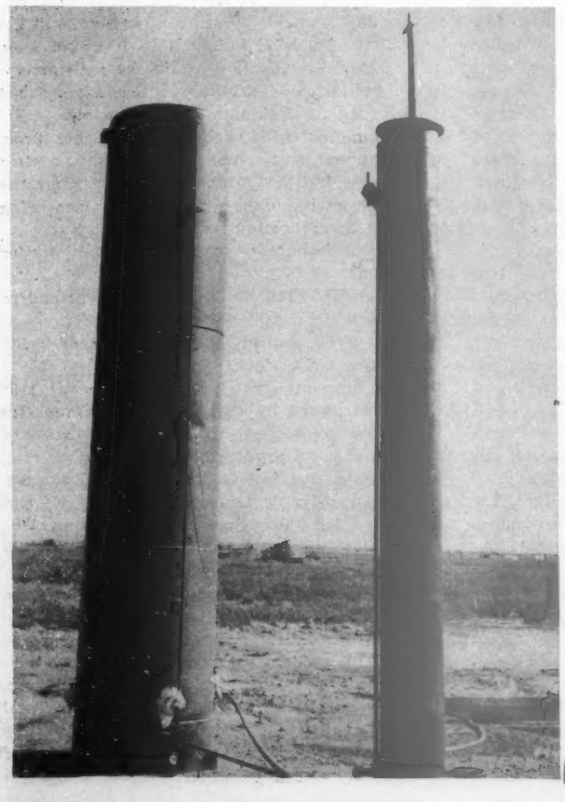
Operating Ideas



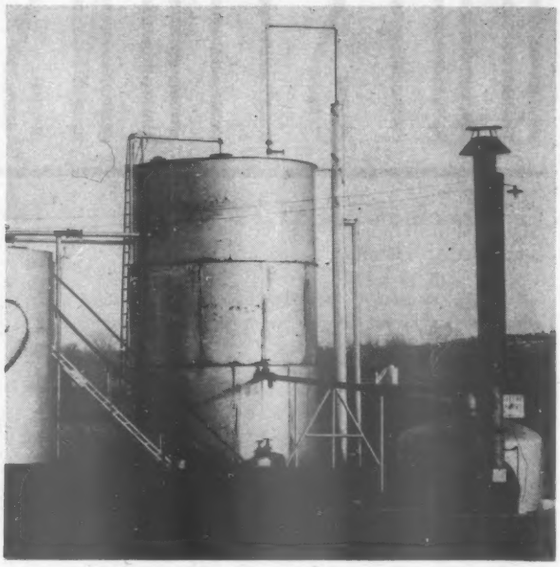
Pulling Unit Has Holder For Pump

The operator of this pulling unit has equipped the front end of the truck with a special device for holding the pump barrel, which has been pulled from the well, while disassembling and working on it. This not only is a handy place for working on the barrel but also keeps the pump off the ground, where it is laid in many cases. The holder consists of padded wooden blocks which are closed vise-like by tightening a bolt.

Fluid-Level Gage Visible At Distance



The water surge tank in the cooling system for the engines in a power plant of an electrified lease in an Oklahoma field is equipped with a fluid-level indicator that is visible to the plant operator from a distance. The indicator, float-operated, consists of a long arm that rises from the top of the tank. By the elevation of the indicator arm the operator can observe the fluid level without the necessity of a trip to the tank to note the glass gage. The device is of simple construction and made from old materials about the lease.



Oil-Heater Set In Ground Aids Treating

The heater on this oil-treating installation in the East Cromwell field in Oklahoma is set in a pit in the ground which not only results in more effective siphoning of the oil from the gun barrel through the heater but also makes for more efficient operation of the heater, particularly in cold weather. The pit protects the heater from cold winds, thus permitting saving in fuel in maintenance of proper temperature. Although not evident in the picture, the pit is large enough to provide ample working space around the heater.

Adjustable Support For Mud Return Line

An easily adjusted support for a mud return line that can be removed quickly has been devised by the contractor on a rig operating in south Texas. It is constructed from a small screw-type jack, which has been fitted with a small supporting base. On the top has been fastened a hinged steel grip that fits around the mud line and when closed and fastened with a single bolt holds the line securely. Elevation of the line is adjusted by a few easy turns of the jack.

CO$T Engineering

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL — PRODUCTION

DECEMBER 31, 1942

SHOULD CONSIDER CONTINGENCIES BEFORE STARTING REPAIR WORK

THERE are probably very few wells in the United States, or elsewhere, whose production or performance could not be improved by some type of workover or repair job. In some the added income or the reduction in costs would be small while in others it would be substantial. The question immediately arises as to why more such work isn't done immediately to bolster the nation's oil output.

The general answer to this question is that the present price of oil and the revenue from the wells do not justify the additional expense and investment. More specifically it is due to the impossibility of determining just how much it is going to cost to do any specific job and just how much additional revenue will be obtained. It is an extremely simple matter to calculate how long it will take to pay out the needed investment if a certain increase in production is obtained. Keeping the cost of the job within the estimated limit and getting the anticipated increase in oil output are entirely different matters.

Operators of oil properties, their superintendents and engineers are as a whole an optimistic group. Normally, they are inclined to minimize the difficulties and the expense involved in a particular job and consequently many workover jobs are attempted which only lead to sorrow. In this connection, an average figure for both the expense and the production increase are to be preferred to a very close estimate of that particular job. If the engineer has kept records of previous attempts he can then arrive at the possible maximum and minimum costs and by taking the average at the probable cost. Any adjustments indicated can then be made to further refine the figure.

Even the simpler jobs, such as acidizing, removing paraffin by any of a number of methods or shooting an old well to increase its productivity can best be estimated on an average basis. The cost of material, the down time of the well and any rig time involved (with one exception) can be rather closely estimated. However, the results from such a job (the increase in production) depend on conditions generally unknown to the engineer and which will vary widely. In some cases, the phenomenal increases in production have been obtained where only a slight stepup in output could have logically been expected. On the other hand, there have been disappointing results when in view of the available facts the production increase should have been substantial.

In one of the above type jobs, that of shooting an old well, it might be well to point out that the rig time cannot be too closely estimated as trouble may be experienced in removing the tamp and if an insufficient amount of tamping is used damage to the well may result.

As the particular job involved increases in complexity, so do the dangers of running into additional costs mount. Plugging back to shut off water is an excellent example. The engineer may calculate down to the last bag the amount of cement to be used, only to find that due to the presence of a cavity, a porous zone, he must use 10 or 20 times that amount. Rig time and cementing services mount accordingly. Or, if original estimates of the amount of material prove to be correct, the decrease in water influx is so small that no substantial benefit has accrued. It might be remarked in passing that often the success or failure of such a job depends on just how the well was originally completed. If the completion was designed for subsequent plugging back of the well, the chances of success are increased.

The increase in depth of the well also affects materially the cost of any well servicing, cleanout or repair job. On shallow wells the work can be accomplished with a light machine which can be rigged up in a few hours. Generally the labor is not as expensive on the hourly rate, fewer men are required and the total hours required are less than on a deep project. Machine rental may run as low as $25 per day or the company may have suitable equipment which has already been depreciated off, labor amounts to $50 per day and the necessary work may be done in from 3 days to a week. The chances of getting into a serious fishing job are not great.

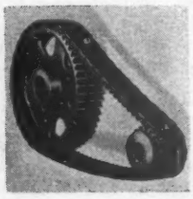
Cleaning out a deep well requires the rigging up of a heavy cable-tool or rotary rig, generally the latter. For instance, a common job on deep wells is the pulling of liners when attempts to clean them with explosives or by washing fails. Daily expense of a job recently completed was $600, including special tool rental. The job required 15 days, a total of $9,000.

This is not an unusual case and frequently the cleaning of sand from a deep well (a comparatively simple type of workover) may run into considerable difficulty. A common occurrence is the sticking of bailer or sand pump, the recovery of which requires rigging up a rotary and either milling over the pump or sidetracking the well. If adverse conditions are encountered as much as $50,000 may be required to get the well back on production.

In a recent series of cleanouts in a pool slightly deeper than 6,000 ft., the company doing the work found that in every case it required from 10 to 400 per cent more time and money than was originally estimated and at the conclusion of the work the wells had been improved only enough to barely pay out the added investment.

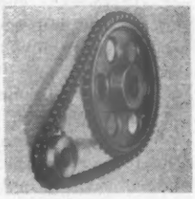
The selection of procedure to be followed in such work is of extreme importance, particularly after difficulties are encountered. While it may have been advisable to start the work on the basis of spending as little as possible, serious trouble changes the picture. It has been found that it is ultimately cheaper to use an expensive and sure method than it is to attempt to employ less costly ones which are makeshifts or expedients.

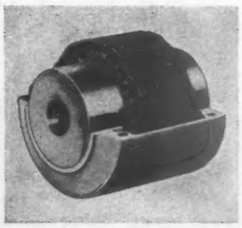
AN IMPORTANT ADVANTAGE IN PLANNING POWER DRIVES



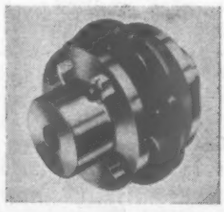
Morse Silent Chain Drives operate at practically 100% efficiency, year after year. Quiet and smooth in operation, they insure maximum machine output. The Morse principle of "Teeth, Not Tension," means no slip—no wasted power. Wide range of chain capacities.

Morse Roller Chain Drives are equipped with effective "oil feed" system in every link. This exclusive design gets oil to the heart of chain. Oil gets in, wear stays out! They last longer, require less maintenance. Interchangeable and available in single and multiple widths.

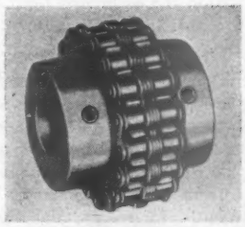




Morse Silent Chain Couplings compensate for shaft misalignment. This simple and rugged coupling consists of two facing steel sprockets wrapped with Morse Silent Chain—enclosed in a machined split case. Links acting on sprocket teeth form flexing medium. They are easily installed and available in many sizes.



Morse Morflex Couplings contain two steel hub members and a floating center unit assembly to which each hub is separately connected through resilient rubber trunnion blocks. There is no metal on metal movement. Rubber allows for maximum distortion without loss of efficiency. Cuts maintenance cost.



Morse Roller Chain Couplings embody many outstanding features that make for unusual flexibility and long-life. Highly compact, they consist of two facing sprockets wrapped with Morse Roller Chain. Easy to install and align. Wide range of stock and special sizes—covers if desired. Send for coupling data today.

SILENT CHAINS ROLLER CHAINS FLEXIBLE COUPLINGS CLUTCHES

MORSE *positive* DRIVES

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CO$T Engineering

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL EQUIPMENT

DECEMBER 31, 1942

FREIGHT RATES ARE IMPORTANT IN DETERMINING CASING COSTS

IF an operator has decided to run seamless casing in an oil well, his choice of pipe is dictated by other than the price situation. This item of equipment has an established price and even the freight rate is adjusted so that delivery at all points of origin to any specified point costs the same.

The selection of the grade and weight are within the province of the field engineer and the field superintendent. Frequently, it may be necessary to run larger pipe, heavier pipe or a better grade of pipe than originally specified by the main office. This may be required by local conditions. Also, at the present time there is always the problem of securing the material and quite commonly, either lighter or heavier pipe, or better or lower grade, than originally called for may be used.

Examination of the accompanying table shows a number of things. It is realized that price is always changing and that the list may be out of date before long. However, the relationship between the various grades and weights will remain and can serve as a guide when purchasing pipes. There is also the fact that freight rates do not change so often and there are cases where the freight is an important item.

Safety Factor

The setting depth in the tables is based on a safety factor of 1.5 which is approved in present practice. A safety factor of 2 used to be common, and in some cases operators may still be paying extra for a margin of safety not required. The tensile strength is not given in the tables principally because the selection is generally made on the resistance to collapse. Where the tension is a serious point, other factors must be considered. Generally, however, the tensile strength follows the resistance to collapse.

The freight rate given in the table is an equalized rate to Odessa, Tex. and the total price is the cost on the cars at Odessa.

A glance at the table will show that the price of 17-lb., H-40, 5½-in. at Odessa costs $86.39 per 100 ft. while 15-lb., J-55, 5½-in. casing costs only $81.82 per 100 ft. The setting depth of the J-55 is greater than that of the H-40. If the setting depth is much under 6,160 ft., it may be possible to go to 14-lb. J-55 which costs only $77.35 per 100 ft. Thus, changing to the lighter and more expensive grade pipe would result in a saving of $488 on a 5,400-ft. well.

The use of 7-in. casing affords another example. The cost of the 20-lb. H-40, 7-in. pipe is $102.66 per 100 ft. This is the lightest pipe which can be set safely to 3,000 ft., the common point for landing the 7-in. protective strings frequently used in the area. The price of J-55, 20-lb. pipe is $110.16 per 100 ft. and consequently, the H-40 pipe generally is used for shallower protective strings. However, if the operator wants to go deeper with the 7-in. casing, say to around 4,000 ft., or any point beyond 3,420 ft., he must step up either the weight or the grade. The price of the H-40, 22-lb pipe, which sets to 4,110 ft., is $113.25. The J-55 mentioned above will go 4,450 ft.

Generally, the smaller the pipe used, the less expensive. However, this does not hold for the selection of surface pipe to be used at depth of less than 1,200 ft. as the lighter 10¾-in. casing, which weighs 32.75 lb. per ft., costs $10.72 less than 36-lb. H-40, 9⅝-in. casing. The setting depth and safety factor of the latter pipe are much greater.

Generally, the tables show that where the weight can be stepped down and the grade of the material increased, the safety factor becomes greater and the delivered price less. This does not hold true in areas where the freight rate is not so important. In such cases the preference would be reversed. The one selecting the pipe therefore has to be as familiar with the freight rates as he does the pipe specifications.

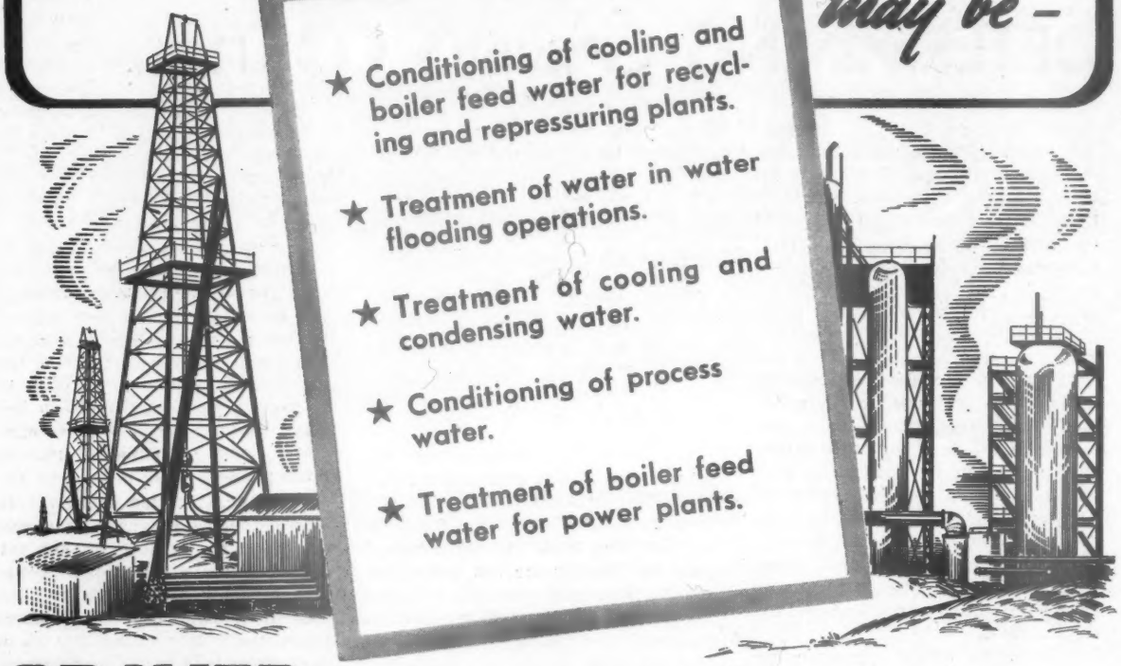
TABLE 1—COMPARATIVE CASING COSTS

Size	Wt. (lb./ft.)	Grade	Setting depth	Price (mill)	Freight to Odessa, Tex.	Price (Odessa, Tex.)
4½	9.5	J-55	5,900	$44.82	$9.86	$54.68
5½	17	H-40	6,160	68.03	18.36	86.39
	15	H-40	4,910	59.99	16.20	76.19
	15	J-55	6,390	65.62	16.20	81.82
	14	J-55	5,640	62.23	15.12	77.35
	15	N-80	8,350	77.42	16.20	93.62
	17	N-80	10,500	88.12	18.36	106.48
	20	N-80	13,400	102.07	21.60	123.67
7	17	H-40	2,440	71.06	18.36	89.42
	20	H-40	3,420	81.06	21.60	102.66
	22	H-40	4,110	89.49	23.76	113.25
	24	H-40	4,550	96.33	25.92	122.25
	20	J-55	4,450	88.56	21.60	110.16
	22	J-55	5,340	97.74	23.76	121.50
	24	J-55	6,300	105.33	25.92	131.25
	26	J-55	7,230	112.92	28.08	141.00
	28	J-55	8,190	120.51	30.24	150.75
	24	N-80	8,240	124.75	25.92	150.67
	26	N-80	9,460	133.73	28.08	161.81
	28	N-80	10,700	142.73	30.24	172.97
8⅝	28	H-40	2,820	126.37	30.24	156.61
	32	H-40	3,740	134.78	34.56	169.34
9⅝	36	H-40	3,040	154.80	38.88	193.68
	36	J-55	3,950	168.30	38.88	207.18
	40	J-55	4,920	193.14	43.20	236.34
	43.50	J-55	5,820	208.16	46.98	255.14
10¾	32.75	H-40	1,270	147.41	35.36	182.77
	40.50	H-40	2,370	171.57	43.74	215.31
	40.50	J-55	3,080	186.76	43.74	230.50

Whatever

YOUR WATER CONDITIONING PROBLEM

may be –



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Engineering Fundamentals

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL No. 61

DECEMBER 31, 1942

NATURAL GAS COMBUSTION

IN some combustion problems it is desirable to calculate the relative amounts of fuel, air, and flue gas.

1. Fuel-flue gas ratio, often expressed as mols of flue gas per mol of fuel.
2. Flue gas-air ratio, expressed as mols of dry flue gas per mol of air.
3. Fuel-air ratio, expressed as mols of air per mol of fuel.

Example 1.

Problem.—The volumetric analysis of the fuel used on a boiler test was:

Methane (CH_4)	93.7%
Ethane (C_2H_6)	5.3%
Carbon dioxide (CO_2)	1.0%

The volumetric analysis of the flue gas, taken on the same test, was:

Carbon dioxide (CO_2)	10.0%
Oxygen (O_2)	3.4%
Nitrogen (N_2)	86.6%

Calculate:
1. Fuel-flue gas ratio.
2. Flue gas-air ratio.
3. Fuel-air ratio.

Solution:

1. By the law of the conservation of matter the weight of any one element leaving the boiler must be equal to the weight entering. Based on this law, a carbon balance, which simply states that the carbon in the fuel equals the carbon in the flue gas, can be applied.

In 1 mol of dry flue gas there is 0.10 mol of carbon (in CO_2).

In 1 mol of fuel there are 0.937 (in CH_4) + 0.053 × 2 (in C_2H_6) + 0.01 (in CO_2), or 1.053 mols of carbon.

Now, let x equal mols of flue gas leaving per mol of fuel entering, and write the following equation:

$$1.053 = (x)\ (0.10)$$

$$x = \frac{1.053}{0.10} = 10.53 \text{ mols of flue gas per mol of fuel.}$$

2. Since the fuel contains no nitrogen, all of the nitrogen in the flue gas is from the air. Then, a nitrogen balance, stating that the amount of nitrogen entering in the air is equal to the amount of nitrogen leaving in the flue gas, will form a basis for calculating flue gas-air ratio.

There is 0.866 mol of nitrogen per mol of flue gas.

From the accepted composition of air, we know that each mol of air contains 0.791 mol of nitrogen.

Now, let y = mols of flue gas per mol of air and write a nitrogen balance as follows:

$$0.791 = 0.866\,y$$

$$y = \frac{0.791}{0.866} = 0.913 \text{ mols of flue gas per mol of air.}$$

3. The fuel-air ratio can be calculated from the results of Parts 1 and 2.

$$\frac{\text{air}}{\text{fuel}} = \frac{\text{air}}{\text{flue gas}} \times \frac{\text{flue gas}}{\text{fuel}}$$

$$= \frac{10.53}{0.913} = 11.53 \text{ mols of air per mol of fuel.}$$

The per cent of excess air may be determined by calculating the amount of air actually used, subtracting the amount theoretically required for complete combustion and dividing the remainder by the amount theoretically required.

Example 2.

Problem.—From the data given in Example 1, calculate:

1. Cubic feet of air theoretically required for the complete combustion of 1 cu. ft. of the natural gas.
2. Per cent of excess air used.

Solution:

1. Take 1 cu. ft. of the gas as a basis; it contains 0.937 cu. ft. of methane, 0.053 cu. ft. of ethane, and 0.01 cu. ft. of carbon dioxide.

Referring to the combustion equations give in Installment 60, it can be seen that each mol of CH_4 will require 2 mols of O_2, or that each cubic foot of CH_4 will require 2 cu. ft. of O_2.

Similarly, from the combustion equation for C_2H_6, it can be seen that each cubic foot of C_2H_6 will require 3.5 cu. ft. of O_2.

So the total O_2 theoretically required for the combustion of 1 cu. ft. of the given natural gas is 0.937 × 2 + 0.053 × 3.5, or 2.059 cu. ft.

To supply this volume of O_2 2.059/0.209, or 9.85 cu. ft. of air would be required.

2. From Part 3 of Example 1, there are actually 11.53 mols of air used per mol of fuel. Since a mol of a gas represents a definite volume of gas regardless of the composition, it is also true that there are 11.53 cu. ft. of air used per cubic foot of fuel.

Then the per cent of excess gas is 100 11.53 — 9.85/9.85, or 17.1 per cent.

Since the fuel contains no nitrogen the per cent of excess air can be calculated from the flue gas analysis without using the fuel analysis. The nitrogen in the flue gas indicates the total air used, while the oxygen in the flue gas indicates the excess air. So in this example, based on 1 cu. ft. of flue gas, 0.866/0.791, or 1.095 cu. ft. of air enters. This air contains 1.095 × 0.209, or 0.2285 cu. ft. of oxygen. The free oxygen (excess) in the 1 cu. ft. of flue gas is 0.034 cu. ft. Then the required oxygen is (0.2285 — 0.034), or 0.1945 cu. ft.

Then the per cent of excess oxygen is 0.034/0.1945, or 17.5 per cent.

The discrepancy between this result and the result by the first method may be due to an error in analysis.

The water present in the flue gas from a boiler does not show up in the flue gas analysis because of the nature of the method (Orsat) commonly applied in making the analysis. This moisture present in the flue gas is from three sources, namely: (1) water carried as a vapor in the fuel; (2) water vapor in the air, and (3) water formed by combustion of the hydrocarbons in the natural gas. The first two items involve a consideration of humidity which will be discussed later in this series. The amount of water formed by combustion can be calculated from the analysis of the fuel, by the following method.

Example 3.

Problem.—Calculate the amount of water formed from combustion of the gas given in Example 1, expressed in each of the following units:

1. Mols of water per mol of fuel.
2. Pounds of water per mol of fuel
3. Mols of water per mol of flue gas.

Solution:

From the combustion equations given in Installment 60, it can be seen that 2 mols of water are formed by the complete combustion of 1 mol of methane and that 3 mols of water are formed by the complete combustion of 1 mol of ethane.

Then, on the basis of 1 mol of the fuel given in this problem 0.937 × 2 + 0.053 × 3, or 2.033 mols of water will be formed.

This is equivalent to 2.033 × 18, or 36.594 lb. of water per mol of fuel.

Now, according to Part 1 of Example 1, 10.53 mols of flue gas are present per mol of fuel.

Then the water formed is 2.033/10.53 or 0.193 mol per mol of flue gas.

Series prepared by Glenn M. Stearns, associate professor of petroleum engineering, University of Oklahoma

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REFINERY ACTIVITY AND EXPANSION

Gasoline Production Reduced By Six East Texas Refineries

FORT WORTH, Tex. — Gasoline sales of the Texas Co., Premier Oil Refining Co., Master Petroleum Co., Sinclair Refining Co., Gulf Oil Corp. and the Magnolia Petroleum Co. refineries located in the East Texas area rose 128,183 bbl. during November, according to reports filed through the East Texas office of the Railroad Commission.

The refineries' motor-fuel production declined from 650,442 bbl. during October to 608,081 bbl. during November while the deliveries of gasoline were rising from 622,278 to 750,461 bbl. in the same periods. Production thus fell 142,380 bbl. short of demand during the last month preceding rationing.

Canadian Synthetic-Rubber Plant To Be Ready Next Summer

SARNIA, Ont.—The synthetic-rubber plant of Polymer Corp. now under construction here and representing an investment of several million dollars is expected to be completed and in operation by next summer. It will be operated in connection with the refinery of Imperial Oils, Ltd.

Acid for Aviation Gasoline Discussed by Chemists

WASHINGTON, D. C.—Means of assuring an adequate supply of sulfuric acid for the manufacture of aviation gasoline was one of the subjects discussed by the Inorganic Acids Industry advisory committee at its second meeting held here last week.

Particular consideration was given to the sulfuric-acid-supply situation on the West and Gulf coasts, particularly in regard to the recovery of alkylation sludge acid, and the possibility of extending the use of hydrofluoric acid in the production of aviation gasoline.

New Kentucky Synthetic Rubber Plant in Operation

Another of the large-scale, government financed synthetic-rubber plants has just begun production operations, it is reported by John L. Collyer, president of the B. F. Goodrich Co., of Akron, Ohio.

The new plant, located in Kentucky, is an important unit in the Government's synthetic-rubber program which on completion calls for the production of more than 875,000 tons of synthetic rubber annually.

Price Differential Allowed Under Amended Directive 59

WASHINGTON, D. C.—In the works for some time, the amended version of PAW's Directive 59 has been made public, permitting the so-called "primary suppliers" (now known, under the amended directive, as "original suppliers") to charge other "original suppliers" for petroleum products at lower rates than they charge secondary suppliers, including distributors, jobbers, etc.

Primary amendment to the original directive reads as follows:

"(e) Subject to the supervision of the district director of marketing, District 1, Petroleum Administration for War, the subcommittee shall arrange for purchases, sales, exchanges and loans of the principal petroleum products among the original suppliers so as to provide each original supplier with a proportionate part of each of the principal products available for distribution in each zone on the basis of each such original supplier . . . the terms and conditions of any sale, loan, or exchange to be made pursuant to this section shall be negotiated between the individual parties to such transaction. . . . If delivery under the sale is made in Zones 1, 2, 3, 4, or 5, District 1, the price agreed upon by all parties shall not ex-

Sketches of Plant Operators . . .

M. P. L. LOVE, director of the Shell Oil Co., Inc., refinery research laboratories at Houston, Tex., a post to which he was appointed in October, has an impressive background of practical experience in manufacturing operations.

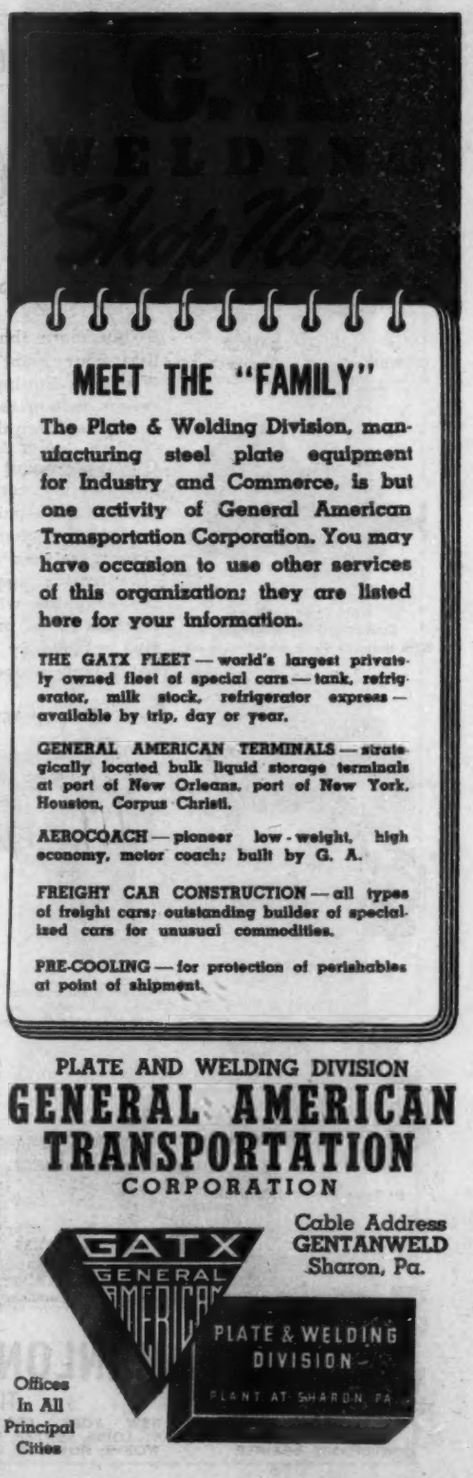
First connection with Shell was in 1928 when Mr. Love was employed at the company's Wood River, Ill., refinery. Ten years later, after acquiring experience in the control laboratory, in the treating department, the cracking department and in the experimental laboratory, he was made assistant to the head of the Wood River research laboratories.

He was transferred to the New York head office in 1940 and assigned the duties of coordinating research for the manufacturing department.

In moving to Houston, Mr. Love is returning to the section of the country in which he was born and where he carried on undergraduate studies in chemistry. He was born at Florence, Miss., in 1907 and attended elementary and high school at Hattiesburg. Later, he entered Mississippi College and received a degree in chemistry in 1925.

Three and a half years of graduate study at the University of Virginia culminated in a Ph.D. in organic chemistry. During this period, he was elected president of the graduate school student body, was a member of the honor committee, Alpha Chi Sigma and Sigma Xi.

He married Fay Chamberlain of Charlottsville, Va., in 1931 and the couple have one son, M. P. L. Love, III, 9 years old who claims most of his father's time and attention away from duties at the laboratory.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ceed the applicable maximum price regulation, as amended or supplemented, or other order of the price administrator, or the sum of the following items, whichever is lower:

"(i) The value of the product at the normal origin, as provided in section (5) (b) (ii) of Petroleum Compensatory Adjustments Regulation 1, issued by Defense Supplies Corp.

"(ii) The cost of transporting the product from the normal origin by the normal method of transportation which was used during the calendar year 1941 to the supply terminal as determined by Petroleum Compensatory Adjustments Regulation 1, except that if, at any supply terminal designated on the schedule . . . such normal cost differs as between original suppliers, then the director of transportation, PAW, may establish the cost of that normal method of transportation by which the greatest volume of the particular product normally moved to the supply terminal."

The amended order also provides that the importer in District 1 may make allowance for reasonable storage and handling costs.

Refiners Assigned Maximum Quotas on Eastern Supplies

WASHINGTON, D. C.—In order to safeguard the Atlantic seaboard's limited stocks of gasoline and fuel oils, Petroleum Administrator Harold L. Ickes last week issued an order controlling the amounts of these products which may be withdrawn from East Coast refineries and terminal supply points.

The control is set up by Petroleum Administrative Order 1, which provides that the sum total of gasoline, kerosene and fuel oils taken from suppliers' tank in the 17 eastern states and the District of Columbia must be within the limits of the supply which the Petroleum Administration determines will be available in that area during any quota period.

To the home owners and to the person who must drive his automobile for essential purposes, the order represents an effort to insure—so far as that is possible in wartime—that, when he presents his ration coupon, there will be fuel oil or gasoline available in the amount to which he is entitled, it was explained by Deputy Administrator Ralph K. Davies. He said:

"On December 18, Petroleum Administrator Ickes issued to the Office of Price Administration determinations as to the volumes of petroleum products available for distribution on the Atlantic seaboard. The amounts certified for January, in barrels, exclusive of aviation gasoline and petroleum for export, were as follows:

"Motor fuel, 331,000; kerosene, 167,000; distillate (heating) oils, 338,000; residual (industrial) oils, 281,000; total, 1,117,000.

"These estimates were furnished to the OPA, whose function it is to determine the manner in which the rationing is to be administered. That office has subsequently announced its new valuation on gasoline coupons, designed to keep consumption of that product within the limits of the expected available supply.

"The logical next step for the Petroleum Administration was to set up controls over the oil companies, so that the amounts which they make available to their wholesale and retail outlets will not exceed the total East Coast supply which we estimate can be brought into this area with presently available transportation facilities.

"This control represents additional protection for the consumer, because it will provide orderly withdrawals from storage, and thus will prevent the suppliers from having their oil stocks completely stripped by unrestricted demand from jobbers and dealers."

As a means of preventing inequities as between different areas of the East, the order allocates specific supplies of oil for use in each of six zones and prohibits suppliers from withdrawing oil in excess of the quotas prescribed for use in each zone. These zones under this order are:

Zone 1—Maine, Vermont, New Hampshire, Massachusetts, Connecticut and Rhode Island.

Zone 2—The entire eastern part of New York, up to and including the counties of Cayuga, Tompkins and Chemung; the entire eastern part of Pennsylvania, up to and including the counties of Bradford, Sullivan, Columbia, Montour, Northumberland, Dauphin and York; and the states of New Jersey and Delaware.

Zone 3—Maryland and Virginia, and the District of Columbia.

Zone 4—North and South Carolina.

Zone 5—Georgia and that part of Florida east of the Apalachicola River.

Zone 6—That part of New York and Pennsylvania not included in Zone 2, and all of West Virginia.

"In setting up its estimates," Mr. Davies said, "the Petroleum Administration is well aware that they do not make it possible for residents of the Atlantic seaboard to have gasoline and fuel oils in the amounts to which they have been accustomed. We know that inconvenience and discomfort are inevitable in the face of restrictions of this type.

"The estimates of supply which Administrator Ickes has given represent the most that can safely be counted upon, considering inventories on hand and transportation available. As I have said before, even this amount cannot be guaranteed. Any unforeseen and unforeseeable military demand, over and above the estimates which have been furnished to us, would unavoidably result in the necessity for revising estimates downward."

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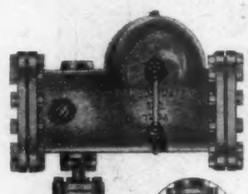
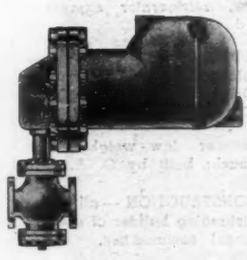
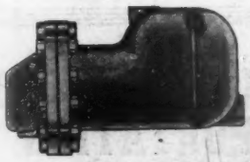


8" Type 148 DRAINER
With manual hand wheel

6" Type 1240
CONTINUOUS DRAINER
With manual hand wheel shut-off.


8" Type 148 DRAINER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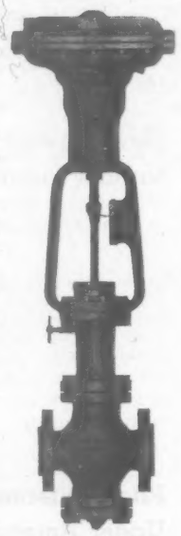
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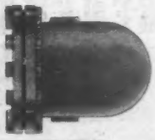
6"x14" Displacement Level Controller. 2-in. Top and bottom flanged body.

6"x14" Displacement Level Controller with 2-in., flanged side connections.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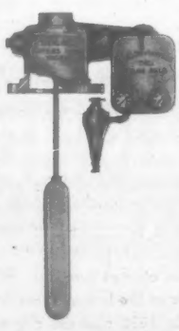
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TULSA, OKLAHOMA

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Pipe-Line Activity

Acquisition of Right-of-Way Permits W.E.P. to Proceed

Construction of the 857-mile eastern extension of the 24-in. War Emergency Pipeline from Norris City, Ill., to refineries at New York and Philadelphia, has been under way more than a week on the main line section west of Phoenixville Junction, Pa., according to Petroleum Administrator Harold L. Ickes.

"In the language of the pipeliners, the first crew to 'set in' on the extension, 'kicked off' the moment they received clearance on the right-of-way. A second and third crew are expected to start work within the next few days, and by early January work should be going full blast on all 17 contract sections."

Deputy Administrator Ralph K. Davies said that more than 160 miles of 24-in. pipe for the extension had already been delivered to distribution points along the right-of-way, and if pumping and terminal equipment could be secured according to schedule the 1,388-mile Texas-East Coast pipe line would start initial deliveries of crude and fuel oils to eastern terminals by midsummer. Laying the Texas-Illinois leg of the line was begun last August and will be completed within a few days.

"Advance deliveries of pipe for the extension are indicative of the speed we hope to be able to maintain on the eastward leg of the War Emergency Pipeline," Mr. Davies said.

"Seventeen experienced construction crews will push the line eastward right through the winter, and despite the hazards and delays to be expected during the winter months, the line should be sufficiently advanced by spring to insure on-schedule completion. The availability of pumping, terminal and oil-storage equipment will determine the exact date of initial operation of the extension."

According to Mr. Davies, the extent to which the added delivery of the 24-in. line might alleviate the critical eastern oil shortage would depend largely on the development of Army-Navy demands for off-shore shipment to the theaters of war.

I.C.C. Declares Champlin Line a Common Carrier

The Interstate Commerce Commission has issued a report finding that Champlin Refining Co., of Enid, Okla., is engaged in transportation of petroleum products by pipe line in interstate commerce and subject to provisions of the Interstate Commerce Act. Hence the company is held to be a common carrier and subject to compliance with the commission's valuation orders which have been served on it.

This decision follows a controversy between Champlin and the commission over this question arising from the I.C.C. request that the company file information necessary for use in valuation of its pipe-line properties.

The I.C.C. held that carriage for the public is the governing factor in the case. It stated counsel for the company had advanced no argument to overcome the fact that the pipe line it operates is utilized by it for transportation in interstate commerce of petroleum products, for distribution to the general public in the territory it serves, adding that such carriers are made common carriers by the act.

The decision said the company emphasized that it transports through its line only its own products and argues therefore that it is a private line coming within the principle of Uncle Sam Oil Co. as stated in what is known as the pipe-line cases in which the Supreme Court upheld that contention. However, I.C.C. says that in this case the products are not being transported for Chaplin's own use but for sale on spot or contract basis made at terminals out of products already transported there and stored for that purpose.

I.C.C. points out that the Supreme Court has held transportation is commerce among the states and that the court said that conception cannot be made wholly dependent on technical questions of title, and the fact that oils transported belonged to owner of the pipe line is not conclusive against the transportation being such commerce.

Project 5 Pipe Line-Barge Movement Is Under Way

CINCINNATI, Ohio.—Gulf Oil Corp. last week announced that six barges containing 2,100,000 gal. of fuel oil are en route and will arrive at its local river terminals within a few days. Additional shipments are in transit.

This fuel oil, refined at the company's plants in Port Arthur, Tex., is pumped to Helena, Ark., through the newly completed war emergency pipe line, known as Project 5. From Helena, the oil is being barged here on the Mississippi and Ohio rivers and immediately upon arrival the job of transferring the cargo to tank cars for delivery to eastern seaboard will begin.

CRC

PIPE LINE CONSTRUCTION EQUIPMENT

CRUTCHER-ROLFS-CUMMINGS
Pipe Line Equipment and Materials
Houston, Texas, U. S. A.

W

WHEATLEY

PUMPS

DUPLEX

2½" to 4" x 6" V-Belt or Direct
46 BPH at 1120 lbs.
125 BPH at 417 lbs.

3" to 6" x 6" V-Belt or Direct
68 BPH at 767 lbs.
288 BPH at 181 lbs.

2½" to 5" x 10" Direct Drive
59 BPH at 1325 lbs.
278 BPH at 330 lbs.

2½" to 7" x 10" Direct Drive
92 BPH at 920 lbs.
557 BPH at 168 lbs.

2½" to 5" x 10" V-Belt
59 BPH at 1400 lbs.
278 BPH at 405 lbs.

3" to 7" x 10" V-Belt
92 BPH at 1203 lbs.
557 BPH at 202 lbs.

2½" to 7" x 10" V-Belt
92 BPH at 1400 lbs.
557 BPH at 303 lbs.

3" to 8" x 10" V-Belt
92 BPH at 1400 lbs.
733 BPH at 230 lbs.

TRIPLEX

3" to 5¾" x 8" V-Belt Drive
156 BPH at 1605 lbs.
631 BPH at 396 lbs.

QUINTUPLEX

2½" to 4" x 6" V-Belt
199 BPH at 1500 lbs.
555 BPH at 600 lbs.

3" to 5¾" x 8" V-Belt
260 BPH at 1605 lbs.
1050 BPH at 396 lbs.

CHECK VALVES

Full Pipe Opening Horizontal Swing
Standard Bronzed Trim
2" to 24"—Series 15-30-40-60
FBE-SBE—FOE & SOE
SYNTHETIC RUBBER SEAL
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GATE VALVES

2" to 12"—Series 30-40-60
Rack Type — Self Cleaning Disc. Has Teeth and Rides a Rack Cast in Valve Body. Cleans each operation — never freezes — easier to operate.

TWIN VALVES

2" to 12"—Series 30-40-60
Flanged Both Ends
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IXC

Independent EXPLORATION COMPANY

★ HOUSTON

★ TEXAS

FIELD DEVELOPMENTS...

HIGHLIGHTS FROM THE WEEK'S NEWS—

The year 1942 has seen less drilling than during any year since 1934. In that year, production had barely passed the 900,000,000-bbl. mark. For the past 2 years, the United States has produced nearly 1,400,000,000 bbl. a year, an increase of more than 50 per cent in less than a decade. Ordinarily, a great increase in drilling activity should be anticipated in 1943 paralleling the rapid increase from the low levels of the depression years to the all-time peak in 1937. The prospects are, however, for a further decline in drilling because of the shortage of steel.

The demand for oil is expected to increase next year. The storage situation is bad and the past few weeks have seen civilian supplies sharply curtailed to meet an emergency, a procedure which will probably be repeated in the future.

The curtailment in drilling will lessen the demand for steel but not to the extent indicated by the reduction in drilling activity. With only about 10,000 new wells coming on production during the year, there will be a considerable increase in the number of pumping wells. A compilation covering the past 7 years shows that 4,400 flowing wells go on the pump each year in Texas. This number may be expected to increase next year as more oil is taken from fields now developed. The natural decline of many fields on settled production will throw a burden on the flush and semiflush fields which will be augmented by the lack of flush production from new fields. It is, in fact, likely that the demand for pumping equipment next year will be nearly double that of a normal year.

In California the trend in recent months is to drill for heavy oil in the old fields so that practically every well drilled in that state now goes on the pump. Few flowing wells are drilled in the Mid-Continent or east of the Mississippi River.

The oil industry will also need much steel for the construction of pipe lines. Existing systems will have to be enlarged or extended so as to tap available production in South Texas and the Permian basin. It is not at all improbable that California will have to get some oil from Texas within the next year or two which can hardly be transported by rail or even by tanker.

The declining output of the eastern and Mid-Continent areas will probably be bolstered as much as possible by the introduction of secondary-recovery methods and some reworking and redrilling. This requires less steel than new wells, but the amount is still considerable. It appears, therefore, that the demand for steel by the oil industry in 1943 will be greater than in 1942 even though fewer wells are drilled. It is also probable that additional oil obtained by the reworking of wells in fields near the market will be small compared to the oil that might be added by new fields.

The industry appears to be in for a period of more expensive recovery methods and many men believe that the discovery rate has passed its peak and that the disruption caused by the war has been imposed on the start of a prolonged period of shortage in the domestic supply.

ROCKY MOUNTAIN AREA: Crude prices in the Kevin-Sunburst and Cut Bank fields of northern Montana have been increased. The Horse Creek field of Laramie County, Wyoming, has been extended ½ mile south, and a test in northeastern Colorado is showing for a producer in the Muddy sand (p. 236).

SOUTHWEST TEXAS: A wildcat in Goliad County is to undergo a series of tests in the Wilcox sand after having logged showings of oil and gas in that formation. A Nueces County wildcat is preparing to drill ahead after recovering only a slight show of oil on a drill-stem test (p. 238).

LOUISIANA GULF COAST: A series of squeeze jobs is being made at a St. Landry Parish test, 3 miles southwest of Krotz Springs, in hopes of shutting off water so a flow test can be made. Activity has been renewed in the Erath field, Vermilion Parish, where four deep-well locations have been staked (p. 236).

TEXAS GULF COAST: Geophysical exploration is increasing with encouraging reports that crude-oil prices in the Gulf Coast area and other parts of Texas will be increased. Operations in the big Katy gas and distillate field are on the upgrade since its extension from Waller into Harris County (p. 238).

CALIFORNIA: A new oil and gas field is in prospect north of Mendota in Madera County where a wildcat test has encountered several well-saturated oil and gas sands. The well flowed at the rate of 8,000,000 cu. ft. of gas daily on a test of one of these zones (p. 240).

PERMIAN BASIN: The Embar-Ellenburger pool has been extended ½ mile to the northeast, the Fullerton pool one location east, and the Means pool ½ mile east. All three pools are located in Andrews County (p. 242).

KANSAS: A Russell County wildcat in the area separating the Gorham, Hall-Gurney and Trapp pools has been completed as a large pumping well. A 1½-mile north extension for the Iuka pool of Pratt County is in prospect (p. 239).

NORTH CENTRAL TEXAS: Several deep wildcat tests in Jack County are nearing their objective with oil or gas showings reported in many of them (p. 236).

EASTERN TEXAS: The new Quitman pool of Wood County is due for an early drilling campaign with contracts already let for north and south offsets to the discovery well and east and west offsets scheduled to start soon (p. 236).

INDIANA: A new oil field is in prospect in Posey County where a test 2½ miles northeast of New Harmony swabbed 55 bbl. of oil in a 5-hour test of the Clore sand (p. 246).

COMPLETIONS IN ALL FIELDS . . .

(Week Ended December 26, 1942)

	Oil	Gas	Dry	Total	Footage	Tll. comp. to date 1942	Tll. comp. to date 1941
N. Y., Pa., and W. Va.	51	4	6	61	108,872	3,491	5,949
Ohio	4	6	6	16	39,896	1,128	1,685
Indiana	0	0	4	4	7,631	348	513
Kentucky	3	0	1	4	7,012	256	652
Illinois	23	0	20	43	109,487	1,881	3,807
Michigan	2	0	5	7	12,624	680	944
Kansas	7	1	13	21	75,490	1,544	2,109
Nebraska	0	0	0	0	0	35	82
Missouri, Iowa	0	0	0	0	0	13	37
Oklahoma	14	2	12	28	81,220	1,196	1,894
Texas:							
North Central Texas	5	1	14	20	69,406	1,072	2,836
West Texas	13	0	3	16	69,664	1,280	2,267
Texas Panhandle	2	2	0	4	12,360	344	711
Eastern Texas	0	0	2	2	10,765	396	1,017
Texas Gulf Coast	3	0	6	9	63,420	681	1,073
Southwest Texas	4	0	8	12	62,469	1,025	1,859
Total Texas	27	3	33	63	288,084	4,798	9,763
North Louisiana	4	2	2	8	31,173	492	787
Louisiana Gulf Coast	4	0	1	5	46,020	460	844
Total Louisiana	8	2	3	13	77,193	952	1,631
Arkansas	2	0	1	3	14,245	184	194
Mississippi and Southeast	0	0	0	0	0	79	278
Montana	2	4	0	6	8,182	208	304
Wyoming	1	0	1	2	6,464	110	176
Colorado, Utah	1	0	1	2	2,925	26	33
New Mexico	0	1	2	3	8,496	261	280
California	12	0	9	21	58,500	818	1,110
Total United States	157	23	117	297	906,321	18,012	31,441
Total previous week	194	37	97	328			
Week ended Dec. 27, 1941	348	64	130	542			

ROCKY MOUNTAIN AREA

Crude Prices Advanced in Northern Montana Fields

By T. R. INGRAM

DENVER, Colo.—An advance in crude prices in northern Montana, the passage by Congress of a bill making a flat rate of 12½ per cent royalty on new discoveries on government land, an extension of the Horse Creek field in Southeast Wyoming and a showing for a producer in the Muddy sand in Northeast Colorado were the outstanding events of the week.

A second advance in crude prices in Cut Bank and Kevin-Sunburst fields took place this week, effective 7 a.m., December 16, under authority of OPA, both fields being upped 10 cents per barrel. This puts Cut Bank at $1.30 and Kevin-Sunburst $1.10. The increased prices are expected to stimulate production if other relief sought is granted in order to supply the Canadian and Oregon and Washington demands. Some adjustments in fuel-oil prices in northern Wyoming fields also were made this fall. Montana, Wyoming and Colorado now have to take care of the Northwest Pacific Coast as far as possible due to decreased shipments into that territory from California.

The Horse Creek field in Laramie County, Wyoming, is on the eve of an important extension ½ mile south of General Petroleum 78-31-G, the discovery well which was completed in October. The discovery well in the SW SE SE 31-17n-68w was drilled to 5,530 ft. and had its principal production in the Lakota sand, pumping 500 bbl. per day gross and cutting some water. The new well, 77-6-P Whittaker, SW SE NE 6-16n-68w, cored the Muddy sand at 5,429-53 ft. and showed good oil and gas saturation, the oil being 34° as compared with 30° in the discovery. The Muddy proved to be a much better sand than in the first well and showed some gas along with the oil as well as being a better grade of crude. It is 100 ft. plus lower than in the well to the north. It is drilling ahead to the Sundance, which was not tested in the first well.

Ramsey Petroleum Corp. 1 Graham, CWL SW SW 14-7n-59w, Buckingham district, northeastern Colorado, is at a critical stage but final results are not yet apparent. It had the top of the Muddy at 6,652 ft., 34 ft. higher than in 1 St. Anthony, ⅓ mile to the northwest. This well was completed in 1932 as a 6,000,000-cu. ft. gas well in that horizon and subsequently abandoned. It cored the sand which showed oil and gas saturation at 6,652-64 ft. An attempted drill-stem test was not successful, although it showed about 1 bbl. of oil in the 5 minutes it was open. Drilling then was resumed and the top of the Dakota was picked up at 6,735 ft. It had about 5 ft. of sand, the first foot showing saturation, but gradually the formation hardened up until drilling progress was very slow.

COLORADO COMPLETIONS

Rangely, Rio Blanco County: Raven Oil & Refining Co. 44, CWL SW NE 31-2n-102w, T.D. 1,502 ft., dry.

Raven Oil & Refining Co. 43, SE NW NE 21-2n-102w, T.D. 1,423 ft., tested 102 bbl., shut in.

WYOMING COMPLETIONS

Big Piney, Sublette County: H. H. Howell 1, NW NE SE 32-30n-112w, T.D. 2,380 ft., dry.

Oregon Basin, Park County: Husky Refining Co. 5 Nielson, NW SE SW 30-51n-100w, T.D. 4,084 ft., 5-in. 4,037 ft., completed in the Embar and shut in.

MONTANA COMPLETIONS

Bowdoin, Phillips-Valley counties: Montana-Dakota Utilities Co. 693, C SW 16-32n-32e, T.D. 1,065 ft., Bowdoin sand 735-791 ft., Phillips sand 920-1,065 ft., 814,000 cu. ft., 302-lb. shut-in pressure.

Montana-Dakota Utilities 714, C SE 36-32n-34e, T.D. 1,065 ft., Bowdoin 766-826 ft., Phillips 880-920 and 1,020-30 ft., 310,000 cu. ft., 203 lb. pressure.

Montana-Dakota Utilities 715, C NE 1-31n-34e, T.D. 1,065 ft., Bowdoin 765-805 ft., Phillips 855-875 ft., 686,000 cu. ft., 200 lb. pressure.

Cedar Creek, Fallon County: Montana-Dakota Utilities 165, SE NW NE 7-10n-58e, T.D. 808 ft., Judith River sand 767-805 ft., 295,000 cu. ft., 110 lb. pressure.

Kevin-Sunburst, Tool County: Hi-Gravity Oil Co. 4 Government, C SE SW 18-35n-3w, T.D. 2,486 ft., contact 2,481-86 ft., on 10-day test averaged 5 bbl.

J. H. Agen 19 Goeddertz, C NE SW 23-35n-3w, T.D. 1,693 ft., contact 1,688-93 ft., on 10-day test averaved 4 bbl. natural.

NORTHWEST NEW MEXICO

Hospah, McKinley County: Petroleum Products Corp. 31 State, SW SW 36-18n-9w, T.D. 1,763 ft., dry in Hospah sand.

Red Mountain, McKinley County: Cecil S. Ringle 1 Van Atta-Government, NW SW NE 30-20n-9w, dry, show oil.

LOUISIANA GULF COAST

Water Shutoff Attempted at St. Landry Parish Test

By T. F. SMILEY

NEW ORLEANS, La.—Gulf Oil & Refining Co. was making a series of squeeze jobs at its 1-E Haas-Hirsch, 3 miles southwest of Krotz Springs, in St. Landry Parish, as the week closed, with a view of perforating for a flow test. This test, now at 11,398 ft., is the deepest yet drilled in the Krotz Springs district. In attempts to squeeze off water sands it was perforated first at 9,217-20 ft., and later at 9,360-63 ft. In the hope of starting production it is supposed the new perforations will be made between those two levels.

Union Oil Co. of California, after opening a new shallow sand in the upper Miocene in the Whitelake area of Vermilion Parish, is preparing to drill another test in the same district. Union completed its 6-A Louisiana Furs, Inc., flowing at the rate of 192 bbl. through 5/32-in. choke from pay at 6,808-13 ft. Total depth was 8,561 ft.

Activity has been renewed in the Erath field. Vermilion Parish, where four deep-well locations have been staked by Texas Co. Expected production is destined for use in recycling plants now under construction. Three of the locations, A, C, and D units, are on the southeast side of the

(Continued on Page 242)

EASTERN TEXAS FIELDS

Early Drilling Campaign Planned For Quitman Pool of Wood County

DALLAS, Tex.—Quitman, the new Paluxy sand pool of Wood County, is due for an early drilling campaign with contracts already let for north and south offsets and east and west offsets to start soon. Shell Oil Co., Inc. 1 J. R. Blalock is a direct north offset to the discovery, Delta Drilling Co. et al 1 Dr. J. B. Goldsmith, and Shell also has a direct south offset on the Goldsmith land in the William W. Lanair Survey. The discoverers have made plans to drill three tests on the William R. Blalock land, S. G. Purse Survey, the first of which will be a direct east offset to the discovery. West of the discovery Amerada Petroleum Corp. plans a test in the east part of the 44.8-acre lease on the J. J. Blalock farm, Edward Goodsir Survey.

Definite location has been staked for Tide Water and Seaboard Oil Co. 1 A. J. Bacon, Franklin County wildcat, 440 ft. from the north and east lines of the 123-acre farm in the John Maximillian Survey, 10 miles south of Mount Vernon. It is understood the Smackover lime is the objective.

EAST TEXAS COMPLETIONS

Wildcats

Upshur County: Blackwell O. & G. Co. 1 M. B. Briggs, Blk. 55, J. B. Davenport Sur., Woodbine 3,712-26 ft., Georgetown 4,048 ft., dry, T.D. 4,100 ft.

Wood County: Magnolia Pet. 1 G. A. McCreight, E. Esparsa Sur., elev. 423 ft., Woodbine 4,458 ft., Georgetown 5,166 ft., Paluxy 6,300 ft., drill pipe stuck, dry, T.D. 6,665 ft.

NORTH CENTRAL TEXAS

Jack County Deep Wildcats Nearing Total Depth

By H. F. SIMONS

WICHITA FALLS, Tex.—The wildcat spotlight is focused on Jack County, which has several deep tests nearing their objective as the year draws to a close. Nine miles south of Jacksboro, Barnsdall Oil and Youngblood & Foree are drilling below 5,125 ft. on 1 Lizzie Garrison in the Thomas Nash Survey; no shows reported so far. Gwynn & Overby 1 J. W. Kinder, 8 miles southwest of Jacksboro in the E. Pearce Survey, has spudded, contract depth 6,400 ft. Hanlon-Buchanan 1 Ellis and DuBose, J. W. Williams Survey, 8 miles northwest of Jacksboro, showed some saturation in the Caddo from 4,785-98 ft., total depth, and has run electric log; 5½-in. casing was set at 4,785 ft. In the southeast part of the county the same operators have passed several oil shows in their 1 Mrs. Dorcas Hensley A. and are drilling below 5,107 ft. in shale and lime. The test is in the M. L. Franks Survey, 8 miles southeast of Jacksboro. Eight miles north of Jacksboro, Hanlon-Buchanan is drilling below 1,775 ft. on 1 W. D. Stinehouse, S.A.&M.G.R.R. Co. Survey, a Strawn sand test. In the Joplin area, Rathke Oil Co. is drilling around 3,500 ft. in shale at its 1 Jagoda, J. Erwin Survey, ½ mile northwest of its 1 Moseley, which was a gas well at total depth of 5,347 ft. but showed some oil.

NORTH CENTRAL TEXAS COMPLETIONS

Wildcats

Archer County: Cochran & Cain 1 J. H. Turbeville, Sec. 173, R. Carson Sur, S.S.O. 1,515-22 ft., tested salt water, dry, T.D. 1,522 ft.

Fortex Oil 1 R. H. Framer, Lot 36, Meade Pasture subd., dry, T.D. 1,557 ft.

Clay County: Continental Oil 6 E. Spring, Lot 25, Marion County School Land Sur., Caddo 5,948 ft., Ellenburger 6,229 ft., dry, T.D. 6,262 ft.

Jack County: Standard of Texas and Hanlon-Buchanan 1 Lucille Gowdy, Sec. 2, T.C.R.R. Co. Sur. A-1888, Caddo 5,026 ft., dry, T.D. 5,126 ft.

Young County: Roy Lee trustee 1 W. J. Baze, NE NE Sec. 354, T.E.&L. Sur., Caddo 4,103 ft., Barnett 4,805 ft., Mississippi 4,848 ft., dry, T.D. 4,900 ft.

Fields

Burkburnett, Wichita County: Fisher & Dudley 15, F. P. Warren, L. B. Talliaferro Sur. A-541, dry, T.D. 1,661 ft.

Burns-Morrison, Young County: L. T. Burns 2 Gillie M. Morrison, Sec. 246, T.E.&L. Sur., 611 bbl., pay 4,853 ft., T.D. 4,881 ft.

Clingingsmith, Montague County: Sinclair Prairie 3 J. P. Clingingsmith, Lot 149, J. H. Belcher subd., pumped 170 bbl., 78 bbl. salt water, pay 6,011 ft., T.D. 6,021 ft., lime.

Consolidated, Wilbarger County: Consolidated Oil 1 W. T. Waggoner II, Sec. 36, Blk. 6, H.&T.C. Ry. Sur., dry, T.D. 4,450 ft.

Forestburg, Montague County: Magnolia 1 E. H. Medley, G. W. Fannin Sur. A-1027, 33 bbl., pay 7,240 ft., T.D. 7,253 ft.

Iowa Park, Wichita County: Hanlon-Buchanan 17-AA T. L. Burnett, Sec. 34, H.&G.N. Ry Co. Sur. A-435, dry, T.D. 907 ft.

Loving, Young County: C. B. King 2 F. C. Dailey heirs, S. Tynes Sur. A-274, dry, T.D. 534 ft.

Markley, Young County: Rankin & Elliott 1 G. P. Stewart, Sec. 2796, T.E.&L. Sur., dry, T.D. 3,626 ft.

Muenster, Cooke County: Camball Oil 1 W. H. and Louise Campbell, O. F. Leverett Sur. A-607, dry, T.D. 765 ft.

Watson, Clay County: Roy Lee trustee 2 T. Watson A, W. A. Farris Sur. A-148, flowed 110 bbl., pay 5,484 ft., T.D. 5,497 ft., lime.

Whitaker Oil 1 Mrs. L. M. Newton, Sec. 2673 T.E.&L. Sur., 125 bbl., pay 5,464 ft., T.D. 5,479 ft., lime.

WEST CENTRAL TEXAS COMPLETIONS

Fields

Reddin, Taylor County: Butler & Horne et al 3 C. H. Hudson, Sec. 3, J. H. Nabors Sur., Blk. 9, dry, T.D. 2,518 ft.

Butler & Horne et al 2-A Reddin, Sec. 4, J. A. Nabors Sur., elev. 1,779 ft., dry, T.D. 2,563 ft.

Shackelford County: J. W. Keyes 2 A. Andrews est., Sec. 14, E.T.R.R. Co. Sur., dry, T.D. 802 ft.

Strawn, Palo Pinto County: Texas Pacific Coal & Oil 3-X fee B, Thos. Court Survey, 2,500,000 cu. ft. gas, pay 3,031 ft., shot 20 qt. nitro, T.D. 3,082 ft.

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Safety Floor Block

Construction Block

Peerless Snatch Block with Swivel

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TEXAS GULF COAST

Crude Price Increase Expected In Texas Gulf Coast Area

By T. F. SMILEY

HOUSTON, Tex. — Recent developments in Washington have encouraged the hope that crude prices will be increased, and this in turn has given rise to reports that important Gulf Coast operators are laying plans to expand their reserves. Rising activity in geophysical exploration, not only in the Gulf Coast area but in other parts of the state, is said to bear a direct relation to the feeling that better prices for crude are in prospect. Various producing companies are understood to be planning drilling operations in counties which they never have entered thus far.

Lively interest continues in operations expected to reveal the boundaries of the big Katy gas and distillate field, which already has been carried from Waller County into western Harris County. Humble Oil & Refining Co., which recently extended the field in a northwesterly direction with its 1 L. L. Scharff, has staked location for its C-1 American Rice Milling Co. on an 800-acre tract in the H.&T.C. Survey, Abstract 158; J. G. Bennett Survey, Abstract 290, and J. M. Bennett Survey, Abstract 286. The Scharff discovery started off with production of 9,910,000 cu. ft. of wet gas in addition to about 150 bbl. of condensate. The new well is to go to 7,700 ft.

A fishing job was holding up operations on Humble 1-B Houston Farms Development Co., a deep test in the Hall's Bayou area, Brazoria County. Either this well or Harrison & Abercrombie 1-B McDonald, in the Old Ocean area of Brazoria County, is expected to chalk up a record for drilling the deepest hole for oil east of the Rocky Mountains. Each is reported to be headed for 14,000 ft. The Humble operation has reached 13,523 ft., and the Harrison & Abercrombie is past 12,000 ft.

TEXAS GULF COAST COMPLETIONS

Wildcats

Wharton County: Franklin & Tideman 1 Annie Jones et al, SE of Glen Flora, dry at 6,017 ft.
Pan American Production Co. 1 W. C. Babcock, S P. Middleton Sur., dry at 5,788 ft.

SOUTHWEST TEXAS

Wilcox Sand to Be Tested in Goliad County Wildcat

By T. F. SMILEY

CORPUS CHRISTI, Tex.—Interest attached to a wildcat test, 1 J. E. Pettus, in the S. Vela Survey of Goliad County, which is to undergo a series of tests after having been bottomed at 8,982 ft. This Wilcox sand test, drilled by Fain Drilling Co. for its own account, has been taken over by Continental Oil Co. and Atlantic Refining Co. As the week closed, Fain had set pipe for completion of the well, which is reported to have logged shows of oil and gas. The Wilcox was found at 7,325-40 ft. Transwestern Oil Co., Dan Auld, and W. W. Carter are among principal leaseholders in addition to Fain, Continental and Atlantic. The well is 6 miles northeast of Charco, in the Cabeza Creek area.

Location for a wildcat test in Nueces County, about 4 miles northeast of Robstown, has been staked by Phillips Petroleum Co. The test, to go 7,600 ft., is 1 William Heuerman, in the C. Land Survey, on a tract farmed out by Humble Oil & Refining Co. to W. E. Fox, who assigned it to Phillips. Two other wildcats are under way in the lower Gulf Coast territory. One is Smith & Story, Inc., 1-A Martha Earhart, in the Armagosa field area, 14 miles northwest of Alice, in the J. Graham Survey, Jim Wells County. The other is H. R. Smith and H. J. Mosser 1 L. W. Roth, in the George J. Reynolds Survey, Jim Wells County, 1½ miles southwest of Orange Grove.

A 35-minute drill-stem test of R. H. Hawn Co. 1 W. Bauer, a Nueces County wildcat, 1½ miles northeast of Robstown, tested a slight blow. It recovered 60 ft. of mud, with slight oil show, with no bottom-hole pressure either flowing or shut in. The test was made at 5,675-93 ft., with ¼-in. chokes at top and bottom. Preparations were made to drill to 5,740 ft., to core.

New wildcat tests staked in the South Texas area included H. B. Zachry Co. 1 S. K. East, 2 miles east of the Chaparosa field in the El Randado grant, Jim Hogg County, and Edwin M. Jones 1 Hays-Ezzell, 16 miles southeast of Tilden, in the L. A. Fant Survey, McMullen County. Six wildcats came in dry, two in Duval County, two in Jim Hogg County, and one each in Starr and Webb counties.

LOWER GULF COAST COMPLETIONS

Wildcats

Victoria County: Rowan & Hope 1 Mrs. M. E. McCampbell, V. Garcia Sur., 5 mi. SW of Inez, Discorbis 4,247 ft., dry at 6,501 ft.

Fields

Chapman, Nueces County: Richardson Petroleum Co. 2 J. O. Chapman, 25 bbl. distillate and 820,000 cu. ft. gas through ⅛-in. choke, T.P. 2,052 lb., C.P. 2,225 lb., T.D. 7,584 ft.
Midway, San Patricio County: F. M. Boynkin, Jr., 1 C. F. Ollie, S.A.&M.G.R. Sur., dry at 7,012 ft.
British American Oil Co. 4 Raymond Mullen, S.A.& M.G.R. Sur., 149 bbl. through ⅛-in. choke, T.P. 990 lb., C.P. sealed, gas-oil ratio 675, T.D. 6,511 ft.
Seeligson, Jim Wells County: Sun 21 P. Canales, A.

(Continued on Page 247)

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KANSAS, NEBRASKA

Russell County Wildcat Opens Area Adjoining Three Fields

By CARL HOOT

ANOTHER wildcat in the area separating the Gorham, Hall-Gurney and Trapp pools was brought in for a good well. N. Appleman 1 Driscoll, NE NE NE 4-15-14w, Russell County, pumped 154 bbl. of 38-gravity oil in 8 hours and was given potential of 463 bbl. Lansing lime was found at 2,957 ft., with pay coming from 2,985-91 ft. Eight-inch casing was set at 2,385 ft. and the well filled 600 ft. with oil in 8 hours.

The Iuka pool of Pratt County had a possible 1½-mile north extension in sight when Skelly Oil Co. 1-B Knopp, SW SW SE 25-26-13w, logged porosity and oil saturation from 3,753-57 ft., 3,761-67 ft. and 3,880-86 ft. Operators were preparing to drill ahead to the Simpson and Arbuckle dolomite. Also on the north edge of the field, Hannum Drilling Co. 1 Calbeck, NW NE 1-27-13w, was dry at 4,347 ft. Simpson sand with only a show of oil was topped at 4,224 ft.

KANSAS COMPLETIONS

Wildcats

Graham County: Aladdin Pet. et al 1 Federal Land Bank, SW SW SW 22-8-25w, dry, T.D. 4,100 ft., Lansing 3,700 ft.

Leavenworth County: Schlottman et al 1 Perkins, SE NE 22-11-21e, dry, T.D. 1,431 ft., Mississippi lime 1,228 ft.

Marion County: Nelson Drlg. 1-A Hacker, SW NE NE 6-17-1e, dry, T.D. 2,757 ft., Mississippi lime 2,745 ft.

Phillips County: Carter 1 Jackson, NW NW 20-4-18w, dry, T.D. 3,506 ft., Topeka 2,855 ft., Lansing 3,080 ft., granite 3,498 ft.

Good & Floyd 1 Hoover, NE NW NE 31-3-17w, dry, T.D. 3,712 ft., Lansing 3,145 ft., Simpson 3,650 ft., Arbuckle 3,694 ft.

Rooks County: Black-Marshall 1 Gartrell, NW NW NW 24-6-20w, dry, T.D. 3,657 ft., Topeka 3,170 ft., granite wash 3,635 ft., Lansing 3,385 ft.

Saline County: Max Cohen 1 Johnson, NE SW SW 30-15-2w, dry, T.D. 3,605 ft., Lansing 2,182 ft., Mississippi lime 2,828 ft., Hunton 3,293 ft., Viola 3,409 ft., Simpson sand 3,590 ft.

Stafford County: J. H. Hershey 1 Firebaugh, SE SW 11-23-13w, dry, T.D. 3,906 ft., Lansing 3,432 ft., Viola 3,758 ft., Simpson sand 3,875 ft., Arbuckle 3,889 ft.

Fields

Curtis, Stafford County: Phillips 1 Bordewick, S½ SE NE 1-22-14w, dry, T.D. 3,831 ft., Viola 3,684 ft., Simpson 3,756 ft.

Gorham, Russell County: Braden & McClure 2 Peterson, NE NW 12-14-15w, pumped 70 bbl., Arbuckle 3,296-3,301 ft., T.D. 3,306 ft.

Iuka, Pratt County: Hannum Drlg. 1 Calbeck, NW NE 1-27-13w, dry, T.D. 4,347 ft., Simpson sand 4,224 ft.

Kraft-Prusa, Barton County: Shell 1 Stueder, NE NW SW 14-17-11w, swabbed 194 bbl. in 6 hr., potential 1,377 bbl., Arbuckle 3,288-3,309 ft.

Leesburg, Stafford County: Plains Exploration 1 Mather, SE NW SW 6-25-12w, dry, T.D. 4,208 ft., Arbuckle 4,185 ft.

Lindsborg, McPherson County: Auto Ordnance 1 Anderson, NE SE 8-17-3w, pumped 65 bbl., Viola 3,332-38 ft., T.D. 3,500 ft.

Marshall, Ellis County: Lario Oil & Gas 13 Marshall, SW NW 31-11-17w, water disposal well, T.D. 4,201 ft.

Morel, Graham County: Barnett Drlg. 1 Kirkpatrick, NE NE 21-9-21w, dry, T.D. 3,772 ft., Lansing 3,434 ft.

Cities Service 2-B Morel, NW SW NE 22-9-21w, pumped 288 bbl., Arbuckle 3,813-19 ft.

Peace Creek, Reno County: Cities Service 2-B Keesling, SW SW SE 1-23-10w, flowed 16 bbl. an hr., potential 3,000 bbl., Viola 3,735-39 ft.

Lion Oil Ref. 1 Yust, SE SE 20-23-10w, 12,000,000 cu. ft. gas, Simpson sand 3,701-15 ft., T.D. 3,810 ft.

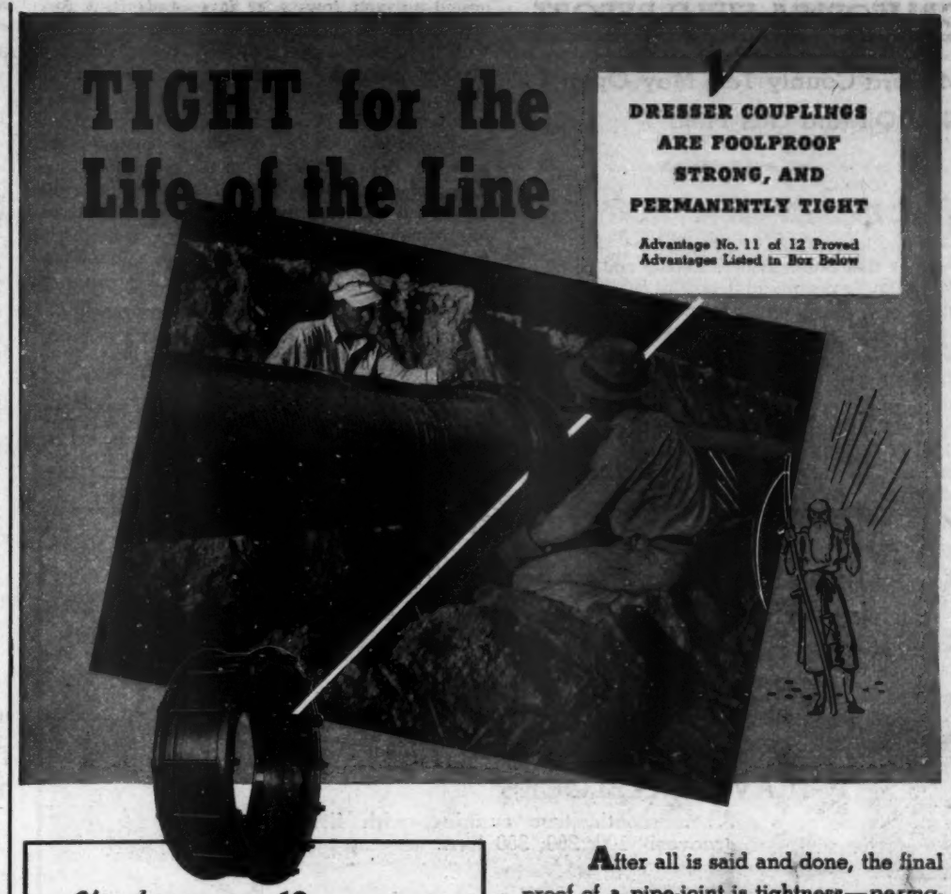
Ray, Phillips County: Cities Service 2-E Reese, SW NE SE 23-5-20w, 1,689 bbl., Arbuckle 3,597-3,600 ft.

Stoltenburg, Ellsworth County: Magnolia 2 Horejsi, NE NW 17-16-10w, pumped 47 bbl., Arbuckle 3,358-74 ft.

FOREST CITY BASIN

ST. JOSEPH, Mo.—Cities Service Oil Co. plugged back its new Missouri well, the 1 Jim Cook in NW NW NW 32-65n-39w, Atchison County, and at the close of the week was perforating casing in the Bartlesville. Some sort of producer should be the result. From total depth of 1,454 ft., the

(Continued on Page 247)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CALIFORNIA FIELD REPORT

Madera County Test May Open New Oil and Gas Field

By L. P. STOCKMAN

LOS ANGELES.—Texas Co. is working on a very interesting wildcat on the Gill ranch north of Mendota in Madera County and based on the results of drilling to date may open up a new oil and gas field in 16-13s-16e, when drilling operations are concluded. This wildcat, the best looking test under way at present, has had a series of oil and gas sands that have looked good and not so good. At 4,419 ft., Texas Co. topped a gas sand that continued to 4,517 ft. then logged 10 ft. of silt and then went into a soft, well-saturated oil sand from 4,527 ft. to 4,562 ft. A formation test was made of the gas-sand interval at 4,419-85 ft. and with the tester open 5 minutes gas hit the surface in 1 minute and flowed at a daily rate of 8,000,000 cu. ft. of gas. On a formation test of the oil-sand interval after the hole had been deepened to 4,595 ft. the company recovered 4,000 ft. of fluid consisting of 2,100 ft. of frothy mud carrying oil and 1,900 ft. of salt water. Texas Co. following the two formation tests has resumed drilling and will core ahead carefully in order to secure as complete a formation log as possible.

SAN JOAQUIN VALLEY COMPLETIONS

Belridge, South, Kern County: Belridge Oil Co. 46-33 fee, 33-28s-21e, pumped 40 bbl., 26.9-gravity, 3 per cent cut, T.D. 850 ft., perf 406-850 ft., completed in upper zone of Pliocene age.

General Petroleum Corp. 28-3 Belridge, 3-29s-21e, pumped 61 bbl., 13.8-gravity, 4 per cent cut, T.D. 1,025 ft., perf. 619-790 ft., 879 929 ft., 950-1,017 ft., completed in upper Belridge zone of Pliocene age.

Coalinga wildcat district, Fresno County: J. F. Harrison 8 Diamond, 35-20s-14e, dry in sand and shale, T.D. 210 ft., no showings logged.

Kern Front, Kern County: Standard Oil Co. 5-8 fee, 8-28s-27e, pumped 35 bbl., 14-gravity, 24 bbl. water, T.D. 2,885 ft., P.B. 2,815 ft., M point 2,445 ft., N point 2,560 ft., completed in Kern Front zone of Pliocene age.

Westates Petroleum Corp. 39 Cauley, 16-28s-27e, pumped 36 bbl., 15-gravity, 19 per cent cut, T.D. 2,951 ft., perf. 2,661-77 ft., 2,785-2,800 ft., 2,840-60 ft., M point 2,514 ft., completed in Kern Front zone of Pliocene age.

McKittrick wildcat district, Kern County: Mac-Vee and associates 1 McKittrick, 33-29s-21e, dry in gray sand, flowed sulfur water, T.D. 1,135 ft., no showings of oil or gas reported.

Midway-Sunset, Kern County: Chanslor-Canfield Midway Oil Co. 46-9 fee, 9-32s-23e, pumped 44 bbl., 15.1-gravity, 25 per cent cut, T.D. 1,670 ft., perf. 1,484-1,670 ft., completed in Midway sand of Pliocene age.

Standard Oil Co. 53-35-B fee, 35-31s-23e, pumped 66 bbl., 24.6-gravity, 7 bbl. of water, T.D. 3,410 ft., perf. 3,199-3,408 ft., scalez 2,790 ft., Wilhelm sand 2,960 ft., gusher sand 3,040 ft., Calitroleum sand 3,340 ft., completed in Calitroleum sand of Pliocene age.

Union Oil Co. 8 Lakeview, 25-12n-24e, pumped 165 bbl., 23.6-gravity, 0.6 per cent cut, T.D. 2,997 ft., perf. 2,722-2,997 ft., recompleted after being deepened from 2,935 ft. to Wilhelm sand of Pliocene age.

Rio Vista gas field, Sacramento County: Peter Cook 2 Cook, 7-4n-3e, dry in gray sand, T.D. 4,791 ft., 7-in. 4,783 ft., did not drill out shoe, perf. 4,654-56 ft., 4,712-15 ft., perf. tested wet.

Round Mountain, Kern County: Shell Oil Co., Inc., 23 Caldwell, 7-28s-29e, pumped 286 bbl., 15-gravity, 0.1 per cent cut, T.D. 1,741 ft., perf. 1,722-41 ft., completed in Vedder zone of Miocene age.

Honolulu Oil Corp. 31-18, 18-28s-29e, pumped 161 bbl., 14.3-gravity, 1.7 per cent cut, T.D. 1,985 ft., P.B. 1,962 ft., completed in Vedder zone of Miocene age.

Drilling Operations Expected To Increase in Near Future

Drilling operations in Los Angeles Basin have been tapering off during the past few weeks but will probably pick up again early in the new year. This is especially true of Wilmington and we may also expect some increased work at Huntington Beach, Brea Olinda, Montebello, and other similar fields. At Montebello, Standard Oil Co. started a conservative drilling program a few months ago but is now expected to step up the tempo as this drilling is being done to increase production of heavy crude oil. Brea Olinda is being further tested out by Union Oil Co. by moving wells farther out on the structure. This work has already resulted in completion of several good flowing wells. A new leasing program has gotten under way in the Huntington Beach field of Orange County and a wildcat will be started in this district early in the new year. Most of this leasing has been by Richfield Oil Corp. and the area being leased has especial merit. This will be an extension of the Huntington Beach field rather than a new discovery and involves the Farnsworth and Newland properties which have been leased and released more times than any other properties in the state.

LOS ANGELES VALLEY COMPLETIONS

Dominguez, Los Angeles County: Shell Oil Co., Inc., 93 Reyes, 33-3s-13w, flowed 335 bbl., 31.5-gravity, 0.3 per cent cut, 580,000 cu. ft. gas, 36/64-in. bean, T.D. 7,573 ft., P.B. 7,400 ft., perf. 6,936-7,121 ft., 7,156-7,395 ft., set whipstock 5,510 ft., redrilled and deepened from 7,106 ft.

Huntington Beach, Orange County: Southwest Exploration Co. 48 State, 4-6s-11w, pumped 272 bbl., 23.6-gravity, 0.7 per cent cut, T.D. 5,352 ft., perf. 4,743-5,352 ft., completed in Huntington Beach tideland accumulation.

Montebello, Los Angeles County: Standard Oil Co. 95 Baldwin, 1-2s-12w, pumped 139 bbl., 13.1-gravity, 55 per cent cut, T.D. 2,935 ft., perf. 2,475-2,933 ft., completed in La Merced zone of Pliocene age.

Palos Verdes wildcat district, Los Angeles County: Surety Holding Co. 1 Palos Verdes, 2-5s-14w, dry in sand and shale, T.D. 1,480 ft., had fair showing but not commercially productive.

Riverside wildcat district, Riverside County: Wonder Oil Co. 1 Stroh, 30-4s-1e, dry in greenish gray shale, T.D. 2,801 ft., no showings of oil or gas cored.

Whittier wildcat district, Los Angeles County: Los Nietos Valley Oil Co. 1 Whittier, 29-2s-11w, dry in gray sand, T.D. 2,800 ft., no showings reported.

H. & C. Oil Co. 1 Joyce, 22-2s-11w, dry in gray sand. T.D. 4,576 ft., no showings reported.

Wilmington, Los Angeles County: Hollywood Oil Co. 1 Baxter, 33-4s-13w, pumped 304 bbl., 16.4-gravity, 15 per cent cut, T.D. 3,424 ft., P.B. 3,329 ft., perf.

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2,650-3,020 ft., recompleted reconditioning work which consisted of perf. liner and cleaning out hole.

Long Beach Oil Dev. Co. 33-W Harbor, 9-5s-13w, pumped 135 bbl., 15.9-gravity, 0.5 per cent cut, T.D. 3,467 ft., perf. 3,213-3,462 ft., completed in Ranger zone of Pliocene age.

Royalty Service Corp. 5-A Nelson, 33-4s-13w, pumped 43 bbl., 14.2-gravity, 20 per cent cut, T.D. 3,490 ft., perf. 2,507-2,858 ft., set whipstock 2,562 ft., redrilled and deepened from 3,050 ft. to Ranger zone of Pliocene age.

Texas Co. 7 Refinery fee, 27-4s-13w, pumped 40 bbl., 14.5-gravity, 7 per cent cut, T.D. 3,543 ft., perf. 3,370-3,531 ft., completed in Ranger zone of Pliocene age.

Preparations Under Way to Test Deep Zones in Del Valle Well

In the coastal district, the most important development is the impending combination formation and production test to be made on 2 Barnes in the Del Valle field of Los Angeles County. This well, which has found several zones below the third Modelo of Miocene age, has been bottomed at 9,870 ft. in oil sand and shale and has 7-in. casing cemented at 9,700 ft. This zone has looked very good during the course of drilling and it is generally regarded as having exceptionally good promise of resulting in large flowing production. Higher up in the hole, R. E. Havenstrite, the operator, has another zone or two that may make commercial production. It is quite likely, however, that these upper horizons will be tried out in new wells rather than take a chance with 2 Barnes. The outcome of drilling will be watched with interest as this well may change a rather mediocre field into a district of large production. To date the Modelo zones of Miocene age have been disappointing and it was questionable whether drilling costs could be recovered before the discovery of this new deep zone in 2 Barnes. The outlook has now changed for the better and the field looks very much improved.

COASTAL DISTRICT COMPLETIONS

Goleta wildcat district, Santa Barbara County: Security Land & Royalty Co. 1 County, 12-4n-28w, dry in Sespe shale, T.D. 3,290 ft., no oil or gas showings reported.

Santa Maria, Santa Barbara County: Standard Oil Co. 5 Los Flores, 33-9n-33w, dry in gray sand, T.D. 5,608 ft., Cat Canyon zone of Miocene age was barren at this location.

OKLAHOMA FIELD REPORT

Seminole County Wildcat Finds Oil and Gas in Hunton Lime

By CARL HOOT

WILDCATS were active in Oklahoma last week with two tests showing oil and two flowing gas. In Seminole County, north of the West Cromwell pool, Kerlyn and Continental 1 Scott, NW SW SW 3-10n-7e, had oil in Hunton lime topped at 4,182 ft. A drill-stem test at 4,180-4,200 ft. recovered 120 ft. of oil and 270 ft. of oil and muddy water. The well had an estimated 1,000,000 cu. ft. of gas at a bottom-hole pressure of 1,700 lb. Also in Seminole County, Thompson Brothers 1 Fleet-Osborn, SW NE 12-5n-6e, was ready to be put on the pump after swabbing 55 bbl. of oil in 8 hours. Total depth was 1,808 ft., with the packer set at 1,745 ft.

In Hughes County, Burke-Greis 1 Strickland, NW NE NE 19-7n-10e, was drilling below 3,900 ft. after flowing from 5,000,000 to 10,000,000 cu. ft. of gas from the Cromwell sand at 3,835 ft.

A west outpost to the old Watchorn pool in Pawnee County, Wood Oil Co. 1 Gilbert, SW SW NE 30-23n-3e, was drilling below 3,350 ft. A drill-stem test in Layton sand at 2,725-40 ft. recovered 300 ft. of oil and 2,000,000 cu. ft. of gas.

Completion reports on northern fields were delayed due to the Christmas holidays. However, considerable work is under way in southern Oklahoma. In the Velma field of Stephens County, Skelly Oil Co. opened a fifth producing zone at its 1-C Frensley in SW NE SW 25-1s-5w. The well was to be put on the pump after swabbing 100 bbl. of oil in 8 hours. Drilled to 1,497 ft., casing was set at 1,337 ft.

A deep test for the Springer area of Carter County; contract to be let after the first of the year, was reported. Location for Pure Oil Co. 1 Pierson, NW NE SE 6-3s-2e, was staked north of the town of Springer and some 5 miles north and east of the new Springer pool, opened by Pure 1 Fraser.

OKLAHOMA COMPLETIONS

Wildcats

Seminole County: Lake Oil 1 Alice Fleet, NW NE SW 7-5n-7e, dry, T.D. 3,902 ft., Hunton 3,425 ft., Sylvan 3,455 ft., Viola 3,578 ft., sandy dolomite 3,870 ft., Wilcox 3,900 ft.

Stephens County: W. J. Price et al 1 Miller, SE NW NW 20-2s-8w, dry, T.D. 1,130 ft., in shale, show gas 859 ft.

Fields

Cement, Caddo County: Ohio Oil 11 Wagner, NE SE SW 12-5n-9w, pumped 90 bbl., pay 3,989-4,099 ft., T.D. 4,141 ft.

Ohio Oil 15 Wagner, NW SW SW 12-5n-9w, flowed 435 bbl., pay 3,305-46 ft., T.D. 3,370 ft.

Loco, Stephens County: J. E. Jackson 1-B Dilly, NE SE NE 7-3s-5w, pumped 20 bbl., pay 402-407 ft., 1,132-52 ft., T.D. 1,162 ft.

Mise, Pontotoc County: Creekmore-Rooney 1 Busby, NW SW SE 11-4n-5e, dry, T.D. 2,504 ft.

Spring, Jefferson County: Seitz, Comgys & Seitz 3-B Barrett, SE SW SE 14-6s-6w, dry, T.D. 1,831 ft., sand 1,849 ft.

Tussy, Carter County: Allied Materials 1 J. H. Epley, NE NW NW 9-1s-3w, pumped 20 bbl., sand 2,373-2,404 ft., T.D. 2,993 ft.

Velma, Stephens County: Skelly 39 Selby, NW SE SE 26-1s-5w, pumped 5 bbl., T.D. 845 ft.

Skelly 40 Selby, NE SE SE 26-1s-5w, pumped 18 bbl., pay 804-858 ft.

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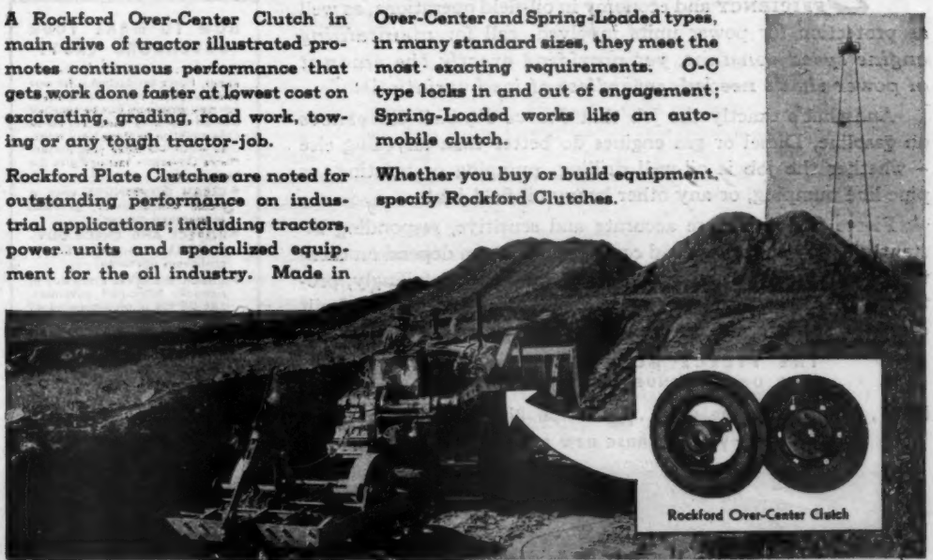

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PERMIAN BASIN, PANHANDLE

Three Andrews County Pools Extended Eastward

By H. F. SIMONS

MIDLAND, Tex. — The Embar-Ellenburger, Fullerton and Means pools of Andrews County were all given short extensions the past week. In the Embar-Ellenburger pool, Phillips Petroleum Co. 30 University extended the deep pool ½ mile northeast when it flowed 50 bbl. per hour with 1,500,000 cu. ft. of gas on drill-stem test run from 7,736-7,888 ft. At last report more pay was being cut in drilling below 7,942 ft. in dolomite.

Texas-Pacific Coal & Oil Co. 1 Jackson, NW NW Section 17, Block A-32, P.S.L. Survey, extended the Fullerton pool one location east when it flowed 45 bbl. an hour from pay topped at 6,785 ft.; total depth was 6,902 ft. This is the upper part of the lower Permian pay, and the two lower pays will be drilled and acidized before the well will be completed.

In the Means pool, Humble 1 Schultz, SW SW Section 5, Block C-45, P.S.L. Survey, ½ mile east of the most northerly producers in the pool, flowed 10 bbl. per hour on gas lift after retreating with 4,000 gal. acid from 4,522-40 ft. in lime. The well was then shut in to build up pressure.

WEST TEXAS COMPLETIONS

Wildcats

Scurry County: Col-Tex, Ref. 1 Maxie Wilson, SW NE Sec. 174, Blk. 97, H.&T.C. Ry. Co. Sur., elev. 2,379 ft., dry, T.D. 4,015 ft.

Fields

Emperor, Winkler County: Skelly Oil 54 S. M. Halley, NE SE NW Sec. 6, Blk. B-11, P.S.L. Sur., elev. 2,765 ft., flowed 604 bbl. 31.6 gravity, pay 2,729 ft., T.D. 2,883 ft.

Keystone-Colby, Winkler County: Ralph Lowe 1-C Seth Campbell, NW SE Sec. 28, Blk. B-3, P.S.L. Sur., flowed 132 bbl. 38 gravity, pay 3,280 ft., shot, T.D. 3,319 ft.

Slaughter, Cochran County: J. C. Hawkins 3-A Mallet, NE Lab. 25, Lge. 47, Edwards County School Land Sur., flowed 846 bbl. 32 grav. pay 4,915 ft., acid, T.D. 4,968 ft.

J. C. Hawkins 6-A Mallet, SW Lab. 24, Lge. 47, Edwards County School Land Sur., flowed 889 bbl., pay 4,933 ft., acid, T.D. 4,981 ft.

J. C. Hawkins 24-A Mallet, SE Lab. 16, Lge. 47, Edwards County School Land Sur., elev. 3,635 ft., flowed 679 bbl. 32 gravity, pay 4,923 ft., acid 11,500, T.D. 4,963 ft.

Texas Co. 7-F Mallet, NW Lab. 15, Lge. 51, Scurry Co. School Land Sur., elev. 3,644 ft., flowed 246 bbl., pay 5,012 ft., acid, T.D. 5,065 ft.

Slaughter, Hockley County: J. C. Hawkins 14-A Mallet, SE Lab. 23, Lge. 47, Edwards County School Land Sur., flowed 1,034 bbl. 23 gravity, pay 4,928 ft., acid, T.D. 4,990 ft.

T. F. Morrow 3 Mallet, NE Lab. 23, Lge. 48, Edwards County School Land Sur., flowed 623 bbl. 32 gravity, pay 4,912 ft., acid, T.D. 4,965 ft.

T. F. Morrow 7 Mallet, Lab. 22, Lge. 48, Edwards County School Land Sur., elev. 3,608 ft., flowed 994 bbl., 32 gravity, pay 4,920 ft., acid, T.D. 4,968 ft.

T. F. Morrow 11 Mallet, NE Lab. 21, Lge. 48, Edwards County School Land Sur., flowed 724 bbl., pay 4,897 ft., acid 12,000 gal., T.D. 4,956 ft.

T. F. Morrow 12 Mallet, NE Lab. 21, Lge. 48, Edwards County School Land Sur., flowed 744 bbl., 32 gravity, pay 4,916 ft., acid, T.D. 4,965 ft.

Wasson, Yoakum County: Plymouth Oil 1-F Bennett, SE SW Sec. 614, Blk. D, J. H. Gibson Sur., elev. 3,583 ft., flowed 541 bbl., pay 5,200 ft., acid, T.D. 5,265 ft.

West Fuhrman, Andrews County: Neville G. Penrose 2 University, SE NE Sec. 3, Blk. 10, University Sur., flowed 110 bbl. natural, 32.6 gravity, pay 4,380 ft., T.D. 4,620 ft.

PANHANDLE COMPLETIONS

Carson County: Stanolind 5 McConnell, SE NW SW Sec. 187, Blk. 3, I.&G.N. Ry. Co. Sur., O.W.D.D. from 3,258 ft., T.D. 3,305 ft., P.B. 3,224 ft., no gage, gas well.

Cities Service 2 Bennett, SE cor NW Sec. 16, Blk. 3, I.&G.N. Ry. Co. Sur., elev. 3,293 ft., 101,000,000 cu. ft. gas, pay 2,625 ft., T.D. 2,735 ft., lime and dolomite.

Hutchinson County: Gray County Prod. 4 Jasper, Sec. 23, Blk. B-23, T.C.R.R. Co. Sur., elev. 3,203 ft., pumped 40 bbl., pay 3,040 ft., T.D. 3,173 ft., lime and dolomite.

Phillips Pet. 2 Walter (Stewart), SE NE Sec. 19, Blk. M-16, A.B.&M. Sur., elev. 3,333 ft., pumped 272 bbl., pay 3,195 ft., T.D. 3,242 ft.

Phillips Pet. 1 Kell, Cent. Sec. 242, Blk. 3-T, H.&T.B. Sur., elev. 3,533 ft., 51,500,000 cu. ft. gas, pay 2,860 ft., T.D. 3,210 ft., P.B. 3,175 ft.

SOUTHEAST NEW MEXICO

HOBBS, N. M. — Southeast New Mexico had a fairly active week with six wells completed, of which there were three producers, one gas well, and two dry. Late reports from wildcats indicated considerable progress at a number of wells. In Roosevelt County, near the state line, Malco Refining Co. 1 Bilberry was drilling below 5,268 ft. A core at 4,446-60 ft. recovered 4 ft. of lime showing dead oil. East of the Langlie pool in Lea County, Olsen and Atlantic 1 Langlie was drilling below 7,930 ft. in chert and lime. A 2-mile west outpost to the Monument pool in Lea County was staked by B. H. Nolen for a 4,250-ft. test. It is the 1 Snyder, NE NE 29-19-36e, which was spudding in on last report.

SOUTHEAST NEW MEXICO COMPLETIONS

Wildcats

Eddy County, 3 mi. N of Square Lake: Premier Pet. 1 Stablein, NW NE 15-16-30e, dry, T.D. 3,802 ft., water at 3,558 ft.

Lea County: Felmont Corp. 1 State, Lot 11, 5-21-33e, dry, T.D. 3,717 ft., salt 3,640 ft., brown lime 3,690 ft.

Fields

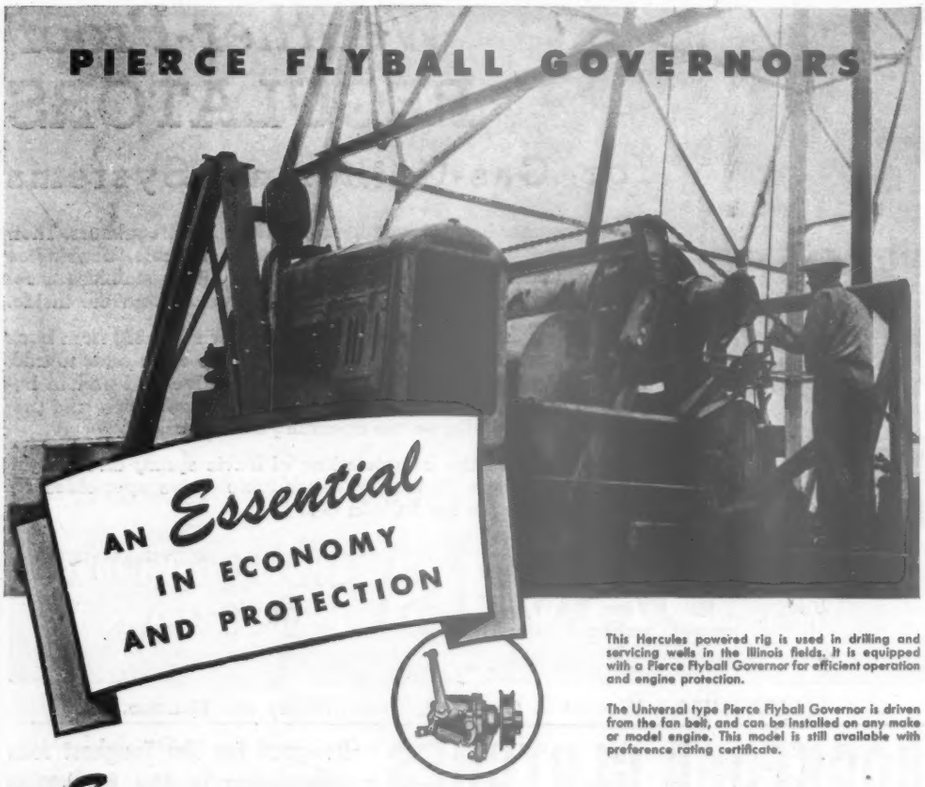
East Lusk, Lea County: Culbertson & Irwin 3 Lynch, SE SW 21-19-32e, pumped 247 bbl., cutting 25 per cent, T.D. 2,776 ft. in lime.

(Continued on Page 247)

Louisiana Gulf Coast

(Continued from Page 236)

field. The fourth, U unit, is on the northwest side. Texas has staked three other tests. One is 26 L. L. E.-Golden Meadow, Plaquemines Parish. 75-19s-15e. The second is 60 State-Garden Island, Plaquemines Parish, 108-23s-32e. The third is 8 Sunset Realty Co., St. Charles Parish, 38-14s-20e.



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- **INSPECT AND CHECK GOVERNORS** each week when in continuous operation.
- **CHECK OIL LEVEL** every day in manually lubricated governors. SAE 20 Oil is recommended at this time of year.
- **LINE UP** driving pulleys or gears accurately when reassembling governor after cleaning.

Should your governor need repair or reconditioning send it to the factory with the necessary preference rating certificate.

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ILLINOIS FIELD REPORT

Madison County Test Encounters Saturation in Shallow Sand

MATTOON, Ill.—The possibility of a shallow sand pay in Madison County attracted the attention of Illinois oil men last week when a wildcat in the northeast part of the county encountered approximately 20 ft. of saturated sand, believed to be the Pottsville. The well is the Kingwood Oil Co. 1 John C. Niggle, NE NE NE 29-5n-5w. The sand was topped at 570 ft., but operators will drill ahead to the Trenton lime before making a thorough test of the sand zone. At last reports the well was drilling below 1,700 ft.

In the new Iola field of Clay County, prospects of a major pool continue to grow with another well, the Tide Water 1 Cora Davis, NE 15-5n-5e finding oil saturation in three formations, the Cypress, Benoist, and Aux Vases sands.

Northward possibilities of the new pool, at least in formations down to and including the Aux Vases, diminished, however, when the Texas Co. 1 E. J. Rush, SE SE NW 10-5n-5e, was reported to have found the Cypress, Benoist, and Aux Vases sands dry. Location has been made by Muhlback & Davis for an attempted northeastern extension of the field with two wells, 1 and 2 Alma Burge, both in SW 11-5n-5e.

Gulf Refining Co.'s Devonian wildcat in Clinton County has been abandoned as dry. The company thoroughly tested the pay possibilities of both the Benoist and Devonian at the well, the 1 E. Martin, SW SE SE 33-3n-1w, about 4 miles east of the Boulder pool, but no show of saturation was encountered. Total depth of the test was 2,953 ft.

In the Boulder pool a third Devonian test for the pool is under way by Murphy & Goldsmith. It is the 4-D Murphy, NE NW 2-2n-2w. Derrick is built and rigging up was in progress at latest reports. Texas Co.'s Devonian well, 4 C. Murphy SW NE 2-2n-2w, is waiting on cement with casing set on the Devonian.

ILLINOIS COMPLETIONS

Wildcats

Christian County: Roy Lee et al 1 Nichols, SE SE SW 28-11n-11e, dry at 1,722 ft., Aux Vases sand 1,540 ft., McClosky 1,634 ft., St. Louis 1,722 ft.

Clay County: Hillblackett et al 1 A. A. Harmon, SE SE NE 27-5n-7e, dry at 2,978 ft., Aux Vases sand 2,783 ft., Ste. Genevieve 2,828 ft.

Clinton County: R. S. Gardenhire 1 Jantzen, NW NW NW 33-2n-2w, dry at 1,526 ft., Aux Vases sand 1,305 ft., Ste. Genevieve 1,415 ft., St. Louis 1,520 ft.

Cumberland County: Falcon-Seaboard et al 1 M. McClain, NW SW 12-9n-7e, dry at 2,531 ft., Aux Vases sand 2,374 ft., Ste. Genevieve 3,417 ft.

Lawrence County: Ed Holmes et al 1 Kelly, NW SE NE 36-4n-12w, dry at 1,992 ft., Cypress sand 1,615 ft., Benoist sand 1,771 ft., McClosky 1,843 ft.

Marion County: Swan-King 1 Cassaretto, NE SE NE 35-4n-2e, dry at 2,139 ft., Benoist 1,906 ft., Aux Vases 1,960 ft., Ste. Genevieve 2,075 ft.

W. P. Mullen 1-D Sloan, SE SE SE 2-3n-1e, dry at 2,227 ft., Aux Vases sand 1,792 ft., Ste. Genevieve 1,872 ft.

Richland County: Sun 1 Lloyd Harding, SE NE NE 26-5n-10e, dry at 3,057 ft., Aux Vases sand 2,888 ft., Ste. Genevieve 2,934 ft.

Roy Lee et al 1 John Miller, NE SW NW 11-4n-14w, dry at 3,057 ft., Benoist 2,768 ft., Aux Vases 2,878 ft., Ste. Genevieve 2,916 ft.

Wayne County: Carl Robinson 1 W. W. Shaffer, SW NW SW 29-2s-9e, dry at 3,420 ft., Aux Vases sand 3,251 ft., McClosky 3,366 ft.

White County: Carter 1 A. Price, SE SE NE 16-7s-8e, dry at 2,994 ft., Aux Vases sand 2,963 ft.

Sinclair-Wyoming 1 C. E. Wilson, SW NE SE 18-7s-9e, dry at 3,243 ft., Aux Vases sand 3,036 ft., St. Louis 3,235 ft.

Fields

Aden, Wayne County: Texas 3 M. E. Heaton, 17-3s-7e, pumped 70 bbl. oil and 40 bbl. water, Aux Vases sand 3,202 ft., T.D. 3,214 ft.

Bible Grove, Clay County: Texas 2 E. F. Bloemker, NW SE NE 4-5n-7e, pumped 261 bbl., Cypress sand 2,502-12 ft., T.D. 2,520 ft.

Texas 3 M. Bloemker, NW NW NE 4-5n-7e, pumped 53 bbl., natural, Cypress sand 2,511-13 ft., T.D. 2,523 ft.

Blairsville, Hamilton County: Tide Water 1 J. A. Lynch, E½ SE SW 16-4s-7e, pumped 7 bbl. oil and 30 bbl. water, shot 3,301-10 ft., Aux Vases sand 3,288 ft., T.D. 3,480 ft., P.B. 3,310 ft.

Magnolia 3 G. L. Travis, NE SW SE 20-4s-7e, dry at 3,329 ft., Aux Vases sand 3,303 ft.

Bluford, Jefferson County: Lario O. & G. 2 Mountain-Matteer, N½ NE SE 36-2s-4e, dry at 3,054 ft., Aux Vases sand 2,924 ft., Ste. Genevieve 2,980 ft.

Boulder, Clinton County: E. F. Jones 2 Harrison, SE NW 2-2n-2w, flowed 590 bbl. oil and 700 bbl. water, acidized in Devonian, T.D. 2,670 ft.

Clay City, Wayne County: Pure 1 M. Clutter, NW NW 11-1n-7e, dry at 3,264 ft., Aux Vases sand 2,992 ft., Ste. Genevieve 3,235 ft.

Covington, Wayne County: Sun 4 J. F. Mauck, SW NW 20-1s-7e, pumped 207 bbl., acidized, Levias 3,224-27 ft., T.D. 3,231 ft.

Dundas, Jasper County: Pure 4 C. A. Myles, E½ SW NW 18-5n-10e, flowed 487 bbl., acidized, McClosky 2,904-09 ft., T.D. 2,930 ft.

Pure 1-C Omer Sayre, SW SW SE 11-4n-9e, dry at 3,040 ft., Aux Vases sand 2,905 ft., McClosky 2,983 ft.

East Centerville, White County: Skelly 2 P. L. Barbee "A," NW NE NE 18-4s-10e, pumped 72 bbl., shot 2,462-2,500 ft., Tar Springs sand 2,457-65 ft., 2,485-95 ft., T.D. 2,500 ft.

Skelly-McBride 2 J. Stone, SW SW SE 7-4s-10e, flowed 432 bbl., perf. Aux Vases sand 3,073-93 ft., T.D. 3,094 ft.

East Inman, Gallatin County: Cherry & Kidd 20 Kerwin, NE NE NW 18-4s-10e, pumped 40 bbl., shot 2,047-60 ft., Tar Springs sand 2,042-52 ft., T.D. 2,061 ft.

Friendgrove, Wabash County: W. E. Bailor 3 R. Laddle, NW SW SW 26-1n-13w, pumped 50 bbl. oil and 20 bbl. water, 5-qt. shot 1,765-69 ft., Biehl 1,759 ft., T.D. 1,771 ft.

King, Jefferson County: Texas 1 D. Baker, SW SE NE 33-3s-3e, pumped 147 bbl. oil and 18 bbl. water, Aux Vases sand 2,735 ft., Levias 2,778-96 ft., McClosky 2,836-62 ft., 2,881-84 ft., T.D. 2,890 ft.

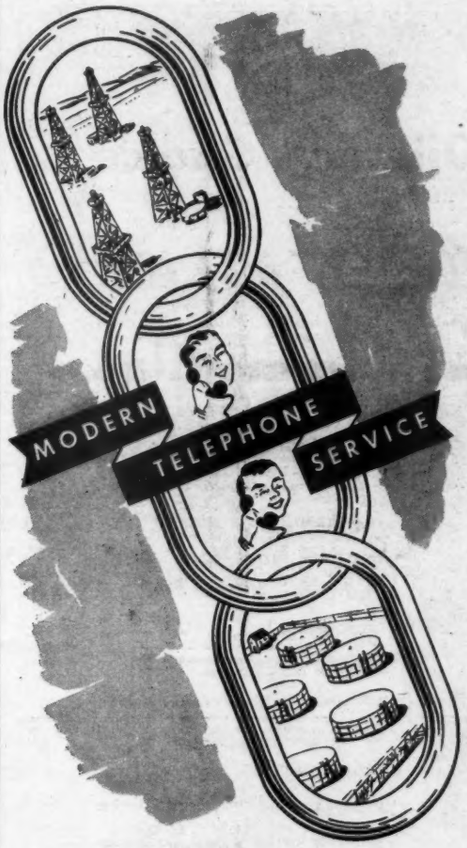
Louden, Fayette County: Carter 16-D W. Ireland, SE NE 32-8n-2e, flowed 100 bbl. oil and 6 bbl. water, Devonian 3,025 ft., pay 3,116-17 ft., T.D. 3,117 ft.

Carter 1 Claggett, NW NW NW 6-8n-4e, pumped 24 bbl. oil and 5 bbl. water, shot 1,545-49 ft., Weller 1,545-52 ft., T.D. 1,552 ft.

New Harmony, White County: Superior 4 G. Lomas, NW NE SW 14-4s-14w, pumped 56 bbl., shot 2,241-47 ft., Tar Springs sand 2,232-43 ft., T.D. 2,247 ft.

North Benton, Franklin County: Armstrong & Day 1 Robinson, SW NE SW 1-6s-2e, dry at 2,878 ft., Aux Vases sand 2,717 ft., Ste. Genevieve 2,744 ft.

(Continued on Page 247)



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CANADIAN FIELDS

Canadian Production Shows Increase

By VICTOR LAURISTON

CHATHAM, Ont.—Crude and natural gasoline production from all Alberta fields for the week ending December 14 averaged 27,637 bbl. daily compared with 27,016 bbl. daily for the preceding week and 28,699 bbl. daily for the corresponding week last year. The daily average included 26,051 bbl. of crude and 1,073 bbl. of natural gasoline from Turner Valley and 513 bbl. of crude from outside fields.

Canadian Production Figures

Official figures of crude production from all Canadian fields for the 10-month period ending October 31, 1942, show a total output of 8,665,941 bbl. compared with 8,370,968 bbl. in the same period last year. Alberta production increased from 8,204,283 to 8,487,914 bbl., New Brunswick from 18,934 to 22,660 bbl. and the Northwest Territories (Fort Norman) from 14,119 to 33,335 bbl. Ontario production in the same period declined from 133,632 to 122,032 bbl. Fort Norman production in October was 1,897 bbl., compared with 4,742 bbl. in September.

Natural-gas production from all Canadian fields in October aggregated 3,423,690,000 cu. ft. of gas compared with 2,882,467,000 cu. ft. in September and 3,009,600,000 cu. ft. in October 1941. The figures do not include Turner Valley waste gas burned in the field.

Deep Tests Get Lime

Two outpost tests in North Turner Valley have encountered the Madison limestone. Northend Petroleum 1, LSD 12, 9-21-3w5, got the limestone at 8,926 ft. and is resuming after cementing casing. This well is in line with Major Oils 9, the first test to get production on the east flank, and was originally expected to get the limestone around 7,500 ft. About 1¼ miles west North Clonmel Petroleum 1, LSD 16, 7-21-3w5, is below 8,521 ft. after getting the Madison at 8,459 ft. The lime horizon is 4,283 ft. below sea level and 125 ft. structurally higher than Home Oil 12 producer, indicating Northclonmel 1 should get production in both the upper and lower zones. An offset location is being selected for Northclonmel 2.

Outpost Well Resumes

An important new development in the North Turner Valley extension

(Continued on Page 251)

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(Continued from Page 140)

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APPALACHIAN

West Virginia Test Finds Gas in Newburg Horizon

PITTSBURGH, Pa. — Completions in the lower eastern fields dwindled to a mere 10 for the past week but the fewness was mainly due to the severe weather conditions and bad roads. New wells consisted of eight gas wells and two dry holes. In West Virginia, a deep test found some gas in the Newburg and 10 ft. below that horizon some salt water. Southwest Pennsylvania was uneventful.

SOUTHWEST PENNSYLVANIA COMPLETIONS

Armstrong County, Kittanning Township: Local Co. 1 Samuel Shuster, 119,000 cu. ft. gas, Murraysville 1,267-1,340 ft., gas 1,325 ft., Tiona 2,835-45 ft., gas 2,838 ft., Bradford 3,285-3,340 ft., gas 3,280 ft. and 3,310 ft., T.D. 3,450 ft.

Fayette County, German Township: Duquesne Gas Co. 2 Charles S. Honsaker, dry, T.D. 3,539 ft.

Westmoreland County, Bell Township: Peoples Natural Gas Co. 1 W. Garmarlengo, 77,000 cu. ft. gas, Bradford and Tiona sands, T.D. 3,228 ft.

WEST VIRGINIA

In Peytona district, Boone County, Owens, Libby-Owens found 133,000 cu. ft. gas in the Newburg horizon and at 4,813 ft. or 10 ft. below the gas had about 5 bailers of water in 16 hours. Here the surface elevation is 713 ft., Big lime 999 ft., Injun 1,186 ft., Berea 1,656 ft., Corniferous lime 4,187 ft., Oriskany 4,280-90 ft., gas 4,284-89 ft., gaging 133,000 cu. ft. The well is shut down at 4,831 ft. for a test.

WEST VIRGINIA COMPLETIONS

Braxton County, Otter district: Pittsburgh & West Virginia Gas Co. 7900 G. B. Howell, 683,000 cu. ft. gas, through Injun sand, T.D. 2,303 ft.

Gilmer County, Glenville district: Pittsburgh & West Virginia Gas Co. 7857 Jacob Moore, 54,760 ft., Big Injun sand, T.D. 2,008 ft.

Marshall County, Liberty district: Manufacturers Light & Heat Co. 3672 V. P. Pyles, 127,000 cu. ft. gas, Fifth sand, T.D. 3,128 ft.

Putnam County, Curry district: Pate Gas Co. 1 Tincher & Zerkles, 103,000 cu. ft. gas, Berea, T.D. 2,372 ft.

Upshur County, Meade district: Cumberland & Allegheny Gas Co. 334 Asa M. Fitzgerald, 91,280 cu. ft. gas, Gordon sand, T.D. 2,130 ft.

ORISKANY GAS FIELDS

Jackson County, Ripley district: Spartan Gas Co. 4 W. E. Walker, 10,060,000 cu. ft. gas before shot, elevation 615 ft., Oriskany 4,952 ft., gas 4,955-64 ft., T.D. 4,984 ft.

Washington district: Godfrey L. Cabot, Inc., 1050 P. S. Fisher, dry, elev. 934 ft., Oriskany 5,255 ft., T.D. 5,332 ft.

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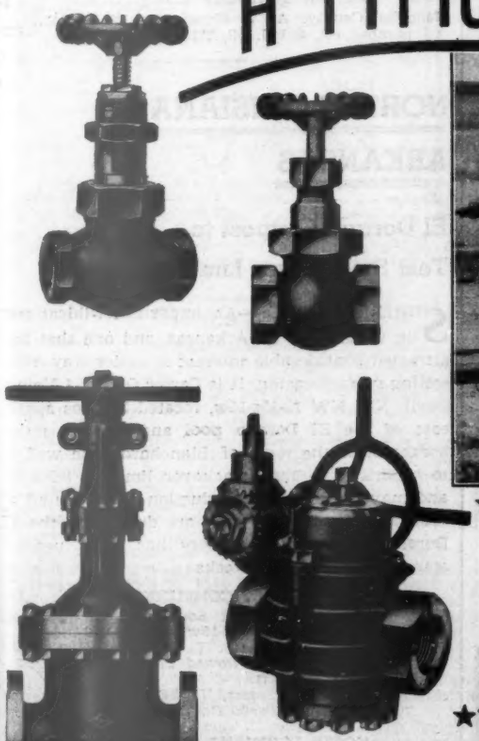

The Newman-Milliken Glandless Lubricated Plug Valve, illustrated here, has many unique features . . . a parallel plug always in close working contact with its body seating—no grit can therefore get between these two surfaces. No gland, no packing, no gaskets. Self sealing and with a visual check on full lubrication. Port openings equal to full size pipe area. Opened and closed by a quarter turn of the plug.

This photograph of an oil field installation shows a number of various types of NH Valves specially designed for the oil industry. They include gate, stop and check valves for high pressures and temperatures steam, oil and gas and for general purposes. Also Newman-Milliken Glandless Lubricated Plug Valves for all oil field services. Working pressures to 3,000 lbs per sq. inch (tested to 6,000 lbs per sq. inch Kerosene) Made in various metals to suit particular services.

Newman, Hender & Co. Ltd
WOODCHESTER NH GLOS. ENGLAND

INDIANA, OHIO, KENTUCKY

Posey County Wildcat Shows For Commercial Producer

EVANSVILLE, Ind. — The Superior Oil Co. 1 Carr, NW NE SW 29-4s-13w, about 2½ miles northeast of New Harmony, is making additional tests of the Clore sand at 1,885-90 ft. after reaming casing opposite the pay zone. After a 5-qt. shot, the well swabbed 55 bbl. of oil and 18 bbl. of water in 5 hours. The Clore sand in the 1 Carr extends from 1,885-1,925 ft., but has not all been tested. The test is located about 3 miles from other oil production and would open up a considerable area to development if found commercial.

At last reports, the Continental Oil Co. was drilling below 3,200 ft. through the St. Louis lime at its 1 Young, SE SE NW 12-3s-13w, a Gibson County wildcat 6 miles west of Owensville. No shows of oil have been found in the well to date.

INDIANA COMPLETIONS

Pike County: J. E. Ellis, tr., 1 C. McAtee, SE SW NE 36-1n-9w, dry at 1,320 ft., Cypress sand 1,313 ft.

Posey County: Roy Lee, tr., 1 Dearing, N½ NE NE 30-8s-14w, dry at 2,780 ft., McClosky 2,738 ft.

Baldwin et al 1 Reichert, SE NW SE 25-7s-15w, dry at 2,125 ft., Menard 1,930 ft., twist off at 1,850 ft., junked hole.

Warrick County: W. P. Dearing 1 W. H. Gentry, SW SW NW 11-4s-8w, dry at 1,681 ft., Aux Vases sand 1,550 ft., Ste. Genevieve 1,555 ft.

OHIO

ZANESVILLE, Ohio.—A gas well gaging 2,494,000 cu. ft. was completed by Belden et al on the O. C. Barber Endowment Co. property in Section 10, Pike Township, Stark County. The well is in a north extension of the Mineral City pool which now runs almost continuously for 18 miles north and south. Sixteen wells have now been completed in the north extension and seven are drilling. The Mineral City pool is the deepest Clinton producing area of any size in Ohio. The depth ranges from 4,700-5,300 ft.

OHIO COMPLETIONS

Athens County, Ames Township: Carpenter and Glazier 1 M. P. Edy, Fr. 13, Cow Run, dry, T.D. 141 ft.

Trimble Township—Ohio Fuel 218 Sunday Creek Coal Co., Sec. 17, Berea, 43,000 cu. ft., T.D. 1,106 ft.

Coshocton County, Clark Township: Ohio Fuel 1 Benjamin Smailes, Lot 32, Clinton, 172,000 cu. ft., T.D. 3,418 ft.

Lawrence County, Symmes Township: Ohio Fuel 1 C. E. Rogers, Sec. 20, Clinton, 163,000 cu. ft., T.D. 3,209 ft.

Medina County, Granger Township: Ohio Fuel 1 J. C. Indoe, Lot 55, Clinton, dry, T.D. 3,530 ft.

Hinckley Township: Belmont Quadrange 4 Cleveland Park Bd., Lot 72, Clinton, 828,000 cu. ft., T.D. 3,317 ft.

Morgan County, York Township: Pure Oil 2 Clarence Williams, Sec. 26, Clinton, 1,220,000 cu. ft., T.D. 4,286 ft.

Perry County, Clayton Township: Preston Oil 2 E. F. Smitley, Sec. 7, Clinton, 75 bbl., T.D. 3,200 ft.

Pure Oil 7 James Pargeon, Sec. 7, Clinton, 50 bbl., T.D. 3,249 ft.

Madison Township: Shuff and Bucy 1 J. W. Shaw, Sec. 32, Clinton, 4 bbl., T.D. 3,167 ft.

Putnam County, Blanchard Township: George Wallace 3 Baker, Sec. 23, Trenton, 5 bbl., T.D. 1,354 ft.

Stark County, Pike Township: Belden et al 3 O. C. Barber End. Co., Sec. 10, Clinton, 2,494,000 cu. ft., T.D. 4,861 ft.

Washington County, Grandview Township: C. W. McCall et al 2 Mary A. Weber, Sec. 27, Injun, dry, T.D. 1,667 ft.

Newport Township: Schneider Oil Co. 2 J. W. Abicht, Sec. 22, Cow Run, dry, T.D. 1,253 ft.

Warren Township: Ross et al 11 R. L. Martin, Sec. 35, Cow Run, dry, T.D. 723 ft.

Wood County, Plain Township: Pember et al 1 A. E. Lein, Sec. 35, Trenton, dry, T.D. 1,400 ft.

EASTERN KENTUCKY

ASHLAND, Ky.—One oil well was completed in eastern Kentucky this week while other operations in many sectors faced a Christmas holiday pause. No gas wells were reported during the week but several are near the completion depth.

New locations were lacking but reports show road building is progressing despite winter weather conditions.

EASTERN KENTUCKY COMPLETIONS

Magoffin County: A. V. Hoenig 33 W. H. Conley, pumped est. 6 bbl. oil, T.D. 1,000 ft.

NORTH LOUISIANA, ARKANSAS

El Dorado Outpost to Test Smackover Lime

SHREVEPORT, La.—An important wildcat test in Union County, Arkansas, and one that has attracted considerable interest is under way after setting surface casing. It is Carter Oil Co. 1 Velma Foyil, NW NW 12-19s-15w, located 3 miles southeast of the El Dorado pool and some 3 miles northeast of the town of Blanchard. The well is to be drilled to the Smackover lime, or 8,000 ft. and may go deeper if production is not found at that level. Two other wells are drilling in the El Dorado area, where activity has been near a standstill for several weeks.

ARKANSAS COMPLETIONS

Wildcat, Columbia County: Southwood Oil 1 J. M. Medlock, SE NE 12-16s-19w, dry, T.D. 6,666 ft.

Stephens, Columbia County: T. W. Lee 1 G. C. Hall, SW SW 11-15s-20w, flowed 270 bbl., sand 2,532-38 ft., T.D. 3,525 ft.

G. H. Vaughn 3-B Smart, NE SE 11-15s-20w, flowed 209 bbl., sand 3,380-90 ft., T.D. 4,054 ft.

NORTH LOUISIANA COMPLETIONS

Wildcat, Bossier Parish, discovery of N. Carterville: Hunt Oil 1 Nebo, SW SE 3-23n-12w, flowed 150 bbl., Pettit 6,029-6,122 ft., T.D. 6,577 ft.

Bear Creek, Bienville Parish: H. L. Hunt 1-A Hodge-Hunt, SE NW 11-16n-6w, 40,000,000 cu. ft. gas, Pettit 6,688-6,714 ft., T.D. 7,248 ft.

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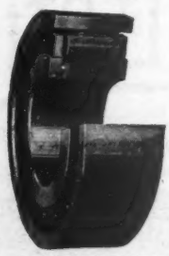
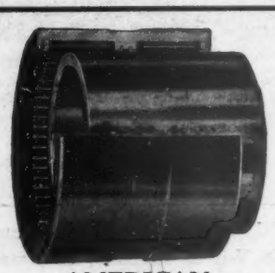


AMERICAN RADIAL BEARING



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Bellevue, Bossier Parish: Premier Investment 1 Wurtsbaugh, Sec. 22-19n-11w, 3,000,000 cu. ft. gas, sand 345-90 ft., T.D.

Caddo, Caddo Parish: A. P. Gilbert 1 Pickens, Sec. 35-22n-16w, dry, T.D. 2,531 ft.

Transport Oil 1-B Stark-Edwards, Sec. 29-22n-15w, 5 bbl., Nacogdoches 1,023-31 ft., T.D. 1,031 ft.

Haynesville, Claiborne Parish: Cook & Johnston 1 Beckett-Waller, Sec. 2-23n-8w, flowed 1,464 bbl., Pettit 5,359-75 ft., T.D. 5,410 ft.

F. R. Sylvestre 2 Winn, Sec. 26-23n-8w, flowed 312 bbl., Pettit 5,506-25 ft., T.D. 5,608 ft.

Olla, La Salle Parish: F. O. Roshko et al 1 Randall, E½ SE SE 11-10n-2e, dry, T.D. 2,378 ft.

Oil-Rate Reductions Amount To $158,000,000 Annually

WASHINGTON, D. C.—The reduction in rail rates for moving oil to the East Coast, made effective early this year when overland shipment of petroleum and products had to be resorted to because of tanker sinkings, amounts to approximately $158,000,000 a year on the basis of the present movement, the Interstate Commerce Commission was told.

The figure was used by the Association of American Railroads in an answer to the petitions filed by Office of Price Administration and other government agencies asking for elimination of the general increase in rail rates authorized in 1942 as a result of 1941 wage increases. The railroads, the answer said, "cannot keep themselves in condition to meet imperative national needs if, at the first sign of adequate earnings, their rates are to be cut forthwith, without regard to the low earnings of the past or prospects of the future."

Offsetting the increases which the petitions seek to have eliminated, the rails pointed out in their answer that they have made voluntary reductions in rates on numerous commodities.

"Many of these reductions have not been in effect for the full year, and their full effect will not be experienced until in 1943, but some idea of what they amount to may be gained from the fact that the cut in rates on oil to the East Coast alone runs to approximately $158,000,000 a year on the basis of present movement."

The reductions were made after shippers of petroleum products had protested that they were suffering large losses because of the higher cost of shipping by rail over tanker charges.

Permian Basin, Panhandle

(Continued from Page 242)

Jackson, Eddy County: Danciger 10-B Turner, SW NE 20-17-31e, flowed 30 bbl. natural top pay 3,403 ft., T.D. 3,450 ft.

Loco Hills, Eddy County: Franklin Pet. 3-A Canfield, 7-18-30e, flowed 30 bbl. in 2 hr., shot, top pay 2,815 ft., T.D. 2,835 ft. in sand.

Square Lake, Eddy County: J. B. Mulcock 2 Etz, SE SW 25-16-30e, 4,000,000 cu. ft., gas, pay 3,000 ft., T.D. 3,016 ft.

Illinois Fields

(Continued from Page 243)

Patton, Wabash County: W. E. Bailor 2 Michael, NW NW NW 35-1n-12w, dry at 1,766 ft., Biehl 1,742 ft.

Hayes & Wolf 1 J. B. Newkirk, SW SW SW 26-1n-12w, pumped 50 bbl. oil and 25 bbl. water, shot 1,759-71 ft., Biehl 1,748 ft., T.D. 1,771 ft.

Phillipstown, White County: Jarvis & Marcell 10 E. E. Spencer, NE NE SE 31-4s-11e, pumped 550 bbl. in 21 hr., natural, Tar Springs sand 2,298 ft., T.D. 2,337 ft.

Jarvis et al 1 Garner, SW SE NW 31-4s-11e, pumped 30 bbl. oil and 30 bbl. water, shot 2,328-48 ft., Tar Springs sand 2,327-48 ft., T.D. 2,348 ft.

Jarvis & Marcell 3 A. H. Cleveland, NE SE SE 36-4s-10e, pumped 220 bbl., natural, Tar Springs sand 2,284-96 ft., T.D. 2,329 ft.

Roland, White County: Kingwood and Sinclair 3-A Hale, NE NW SW 1-7s-8e, pumped 100 bbl. oil and 12 bbl. water, shot 2,243-47 ft., Waltersburg sand 2,241-50 ft., T.D. 2,250 ft.

St. James, Fayette County: Ohio 16 C. T. Williams, NW SE NW 36-6n-2e, pumped 12 bbl. oil and 16 bbl. water, shot 1,606-10 ft., Cypress sand 1,600-06 ft., T.D. 1,613 ft.

South Lawrence, Lawrence County: Brinkeroff Drlg. 1 S. R. Polman, SW SE NE 23-2n-12w, pumped 138 bbl., natural, Biehl 1,328-34 ft., 1,341-46 ft., 1,357-78 ft., T.D. 1,378 ft.

Smith & Nye 5-B E. Spidel, N½ N½ SE 23-2n-12w, dry at 1,405 ft., Biehl 1,399 ft.

Stokes, White County: Pure-Carter 3 Pyle Consol., SE SE SE 18-6s-9e, pumped 140 bbl., shot 2,776-2,810 ft., Benoist sand 2,872 ft., T.D. 2,938 ft., P.B. 2,810 ft.

Walpole, Hamilton County: Texas 4 F. Shavitz, SW SW SW NE 27-6s-6e, dry at 3,101 ft., Aux Vases sand 3,077 ft., Ste. Genevieve 3,093 ft.

Southwest Texas Fields

(Continued from Page 238)

T.P. 250 lb., C.P. 1,225 lb., gas-oil ratio 432, T.D. 6,020 ft.

Stratton, Nueces County: Chicago Corp. 16 G. P. Wardner, O.W.W.O., old T.D. 6,615 ft., squeezed old perfs., perf. 6,399-6,403 ft., 181 bbl. through ⅛-in. choke, T.P. 900 lb., C.P. 1,510 lb., gas-oil ratio 612.

SOUTH TEXAS COMPLETIONS

Wildcats

Duval County: Circle Oil Co. 1 A. Reyes est., J. Pointevent Sur., dry at 3,500 ft.

Ogden & Voyles 2 M. I. Richardson, G.B.&C.N.G.R.R. Sur. 3, dry at 2,705 ft.

Jim Hogg County: Sun 6 Mrs. A. L. East, La Noria de Santo Domingo grant, dry at 4,904 ft.

Sun 2-A T. T. East, Santo Domingo de Arriba grant, dry at 4,993 ft.

Webb County: O. W. Killam 1 Bruni estate, 6 mi. S of Bruni, dry at 3,968 ft.

Fields

North Sun, Starr County: Sun 1 C. Laurel, La Sal Colorado grant, dry at 4,621 ft.

Rincon, Starr County: Continental and W. R. Davis, Inc., 5 Slick estate, C.C.S.D.&R.G.N.G.R.R. Sur. 537, 221 bbl. through ¼-in. choke, T.P. 600 lb., C.P. 860 lb., gas-oil ratio 412, T.D. 4,150 ft.

Canales Sur. 180, 120 bbl. through ¼-in. choke.

Forest City Basin

(Continued from Page 239)

hole was plugged back to 1,444 ft. At 1,454 ft. there had been 900 ft. of water, but a shutoff was effected by plugging back.

The most interesting Nebraska test is the Ferguson & Towle 1 Tiehen in C NE NW 24-1n-17e, a mile southwest of Rulo in Richardson County. Kinderhook shale has been reached.

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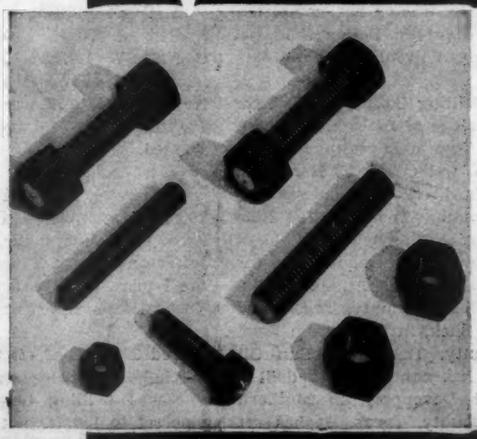

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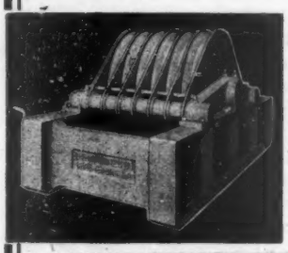

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Among the Drilling CONTRACTORS

GLENN H. McCARTHY, Houston, Tex., will drill a 7,100-ft. test for Angle & Angle on west side of the Big Creek field in Fort Bend County, Texas, 6 miles southwest of Richmond. The well is 1 Albert George.

O. W. DYER, Houston, Tex., has the contract for Atlantic Refining 4 Steirs, 26-3s-11w, in the Neal area of Beauregard Parish, Louisiana. The test is projected for 11,600 ft.

GEORGE H. ECHOLS, Houston, Tex., is near completion of a wildcat which he is drilling for his own account in the Napoleonville area of Assumption Parish, Louisiana. The well, a deep test, is 1 Kessler & Sternfels, 136-12s-14e.

WRIGHT Drilling Co., Houston, Tex., was setting surface pipe for a Barnsdall Oil Co. test, 1 A. C. Westhoff, in the Ganado area of Jackson County, Texas. The same contractor has a string of tools working on 1 C. H. Gurinsky, a wildcat, 4 miles north of Vanderbilt, Jackson County, for H. Merlyn Christie.

GILGER Drilling Co., Houston, Tex., last week finished Grubb & Hawkins 2 Grogan, in the Kildare extension to the Rodessa field in Cass County, Texas. The hole was bottomed at 6,040 ft.

WYNN CROSBY Drilling Co., Houston, Tex., has just completed a workover job on 1 Skelly fee for Francitas Gas Co. in the Francitas field of Jackson County, Texas.

SOUTHERN Drilling & Well Servicing Co., Houston, Tex., has two contracts in the Boling field of Wharton County, Texas. It is rigging up 1 J. H. Pridgeon, in the J. Huff Survey, for Charles A. Elliott et al and is setting surface pipe in 3 Mullins for Danciger Oil & Refining. The same contractor has completed 1 Vineyard in the Boling field for Pan American Production Co.

FAIN Drilling Co., Houston, Tex., has six strings of tools in operation in Texas. Two are for Stanolind Oil & Gas Co. wells, 1 J. F. Henry, in the William Kuykendall Survey, McMullen County, Texas, and 2 Bonnot, in the North La Ward field of Jackson County, Texas. Two are for Continental Oil Co., 3 Austin, a wildcat in Calhoun County, Texas, and 77-A Tom Slick, in the Rincon field, Starr County, Texas. For Sun Oil Co. Fain has contracted to drill a wildcat, 1 Davenport, in southern Hidalgo County, Texas. It has set pipe for completion of 1 J. E. Pettus, a Wilcox wildcat in the Cabeza Creek district of Goliad County, Texas, 6 miles northeast of Charco, in the S. Velva Survey. This well, bottomed at 8,600 ft., drilled for the contracting company's own account, has been sold to Continental Oil Co. and Atlantic Refining Co.

W. P. TAYLOR Drilling Co., Houston, Tex., has completed 1 W. C. Babcock for Pan American Production Co. in the S. P. Middleton Survey of Wharton County, Texas, 3 miles northwest of Louise. This test was dry and abandoned at 5,788 ft.

JORDAN Drilling Corp., Houston, Tex., got a dry hole in 1 Texas Long Leaf Lumber Co., which it drilled for its own account in Polk County, Texas. This wildcat, drilled to 6,515 ft., was in the Thomas Survey, 6 miles east of Leggett.

ROWAN Drilling Co., Fort Worth, Tex., has contract to drill two wells for Shell Oil Co., Inc., in the new Quitman Paluxy sand pool, Wood County, East Texas, discovered last month by Delta Drilling Co., Tyler. Production is found around 6,300 ft. Rowan is keeping three rigs busy in the Barnhart pool of Reagan County for Amerada Petroleum Corp., where pay depths are about 9,300 ft.

GLENN GIBSON, Wichita Falls, Tex., has contract for a 5,000-ft. wildcat test in northwestern Young County for Snoddy Brothers 1 Furr, Section 330, T.E.&L. Survey.

GEORGE P. LIVERMORE, Inc., Lubbock and Fort Worth, Tex., contractor, is about to finish Sharples 1 University in the Barnhart pool, Reagan County, West Texas.

A. G. BEDNAR, Fort Worth, Tex., drilling contractor, is recovering from an operation undergone in a hospital there.

CARPER Drilling Co. topped anhydrite at 470 ft. with its 2 Miller, C NE SW 19-19s-32e, in the East Lusk field of western Lea County, New Mexico, and was drilling past 850 ft., where 8-in. casing was cemented.

GLENN H. McCARTHY, Houston, Tex., has completed a producer on its own account in the Stowell field, Jefferson County, Texas. The well is the 1 Prox, on a 100-acre tract, B. A. Vacoco league, Abstract 53. Perforated at 8,735 to 8,741 ft., the well flowed 325 bbl. of oil through 9/64 in. choke. Company has also spudded and was drilling below conductor pipe set to 150 ft. in the 1 Stewart, wildcat, on the east flank of the Hitchcock field, Galveston County, Texas. This wildcat is projected to around 11,000 ft.

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Personal Paragraphs

ED BORREGO, field superintendent of Standard Oil Co. of Venezuela, is on leave from his duties in eastern Venezuela, and is visiting friends in Tulsa and other points. Before going to Venezuela, Mr. Borrego was connected with the producing operations of Standard Oil Co. of New Jersey subsidiaries in Mexico. On Monday he was the principal speaker at a luncheon of the Tulsa Nomads. He expects to return to Venezuela the latter part of January.

BRUCE H. HARLTON, geologist and paleontologist in Amerada Petroleum Corp.'s Tulsa office, has been temporarily assigned to the firm's West Texas office at Midland, Tex.

MAX W. BALL, president of Abasand Oils, Ltd., was recently reelected chairman of the Northern Alberta branch of the Canadian Institute of Mining and Metallury. R. G. WATSON was elected secretary-treasurer.

H. N. GOODELL, Shell Oil Co., Inc., exploration engineer in the Louisiana division, enlisted in the Marine Corps as a private first class to take a course in the officers candidate school in Quantico, Va.

C. E. LEE, in the production division of Shell Oil Co., Inc., Houston, Tex., recently observed the twenty-fifth anniversary of his service in the Shell organization. F. GOLDSTONE, geophysical division, and O. D. STORY, treasury division, passed their 20-year service milestones.

R. W. HAMLET has been promoted to the position of assistant treasurer in the New York office of Socony-Vacuum Oil Co., Inc. For several years he has been assistant to the treasurer. Mr. Hamlet has been with Socony-Vacuum for 30 years, and for some time was in China.

KURT H. DE COUSSER has been reelected president of the Michigan Oil and Gas Association, along with all the other officers of the group. JAMES GRAVES is vice president, HAROLD McCLURE is legislative secretary, W. B. PARDOE is executive secretary, and W. P. CLARK and GEORGE TALBOT, treasurers.

D. A. HULCY, president, Lone Star Gas Co., has been appointed chairman of the 1943 Dallas (Tex.) War Chest. Mr. Hulcy, a Dallas resident since 1920, has been active in chest campaigns for several years. In 1941 he was chairman of the special-gifts division, and last June was elected to the executive counsel.

BERNARD T. WESTERMAN, formerly with Shell Oil Co., Inc., at Midland, Tex., recently received his wings and a lieutenant's commission in the U. S. Army Air Force following his graduation from the Big Spring, Tex., bombardier school.

L. J. NELSON, Kilgore; J. B. THOMPSON, Gladewater, and BEN GIVINS, Arp, have been named to a membership committee by the East Texas chapter of the A.P.I., according to L. P. O'NEIL, chairman of the chapter.

B. FRANK JOHNSON, Houston, Tex., is the new head of the transportation section under the gasoline panel of the Harris County, Texas, War Price Rationing Board. Other section heads announced by the Office of War Information in Houston are GEORGE M. DOW, fleets; R. B. RANDOLPH, special rations; GEORGE H. DENTLER, A D books; BRACY BENSON, dealers; C. W. McPHAIL, nonhighway; JOHN MAYFIELD, supplemental rations.

J. E. LEAZER, division engineer for Northeast Texas, Humble Pipe Line Co., now supervising engineer for W.E.P. in the Longview, Tex., area, and OSCAR WOLFE, chief engineer of W.E.P., are shown here inspecting the progress of construction at the Longview terminal of the 24-in. crude-oil pipe line.

Do You Remember?

From The Oil and Gas Journal Files

40 YEARS AGO (1902)

A New York dispatch states that a scheme is on foot to induce the British admiralty to experiment with Texas oil, looking to its introduction into the British Navy.

James W. Swayne, of the Hogg-Swayne Syndicate, is critically ill at his apartments in Hotel Waldorf-Astoria, in New York City. He left Beaumont in poor health a week or so ago to meet his daughter who is entering Vassar.

25 YEARS AGO (1917)

On December 26 at Port Arthur, Tex., Gulf Refining Co. posted notice granting an increase of 20 per cent in the wages of all its employes, numbering more than 5,000, beginning January 1. This increase takes the place of the bonus system in effect formerly.

Frank Haskell, Tulsa, Mid-Continent manager of Tidal Oil Co., has been appointed as a member of the Petroleum War Service Committee, formerly known as the Petroleum Advisory Board of the Council of National Defense.

F. S. Roberts, of Roxana Petroleum Co., was joined in marriage last Saturday at Claremore, Okla., with Miss Goldie Oschman, of Claremore.

10 YEARS AGO (1932)

Production of crude oil in the United States last week was at the lowest point since August 1931, when the East Texas field was shut in by order of Governor Sterling. The field, it is expected, will be opened on January 1.

Shell Oil Co. of Canada, Ltd., is rapidly completing the construction of a new refinery in Montreal. The refinery, which is being built exclusively of new equipment, will have a crude-oil capacity of 6,000 bbl. daily.

There is no prospect that the bill introduced at Washington by Senator McGill of Kansas to legalize an interstate compact on oil will get much attention during the lame duck session, but those in favor of it are losing no time in pushing the plan among oil men.

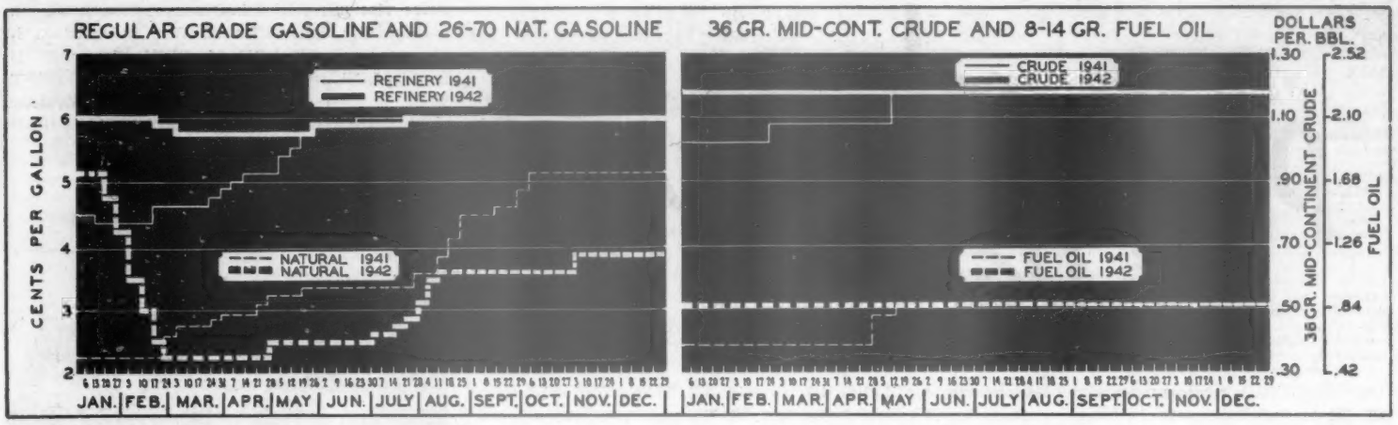
E. J. MACFARLAN, assistant manager of the foreign department, Standard Oil Co. of California, has been elected a vice president and a member of the board of directors of the Marine Exchange for 1943.

C. FREDERICK STYER, who has served almost 25 years with Pure Oil Co., recently retired because of poor health. He started at the Heath refinery 17 years ago, spent 2 years with the Michigan pipe line and 5 years as general foreman of the Illinois pipe lines.

W. E. HUMPHREY and I. K. NICHOLS, geologists for Texas Co., are back in the New Orleans office of the company's Louisiana-Arkansas division after completing foreign assignments. Mr. Humphrey was working in northern Mexico and Mr. Nichols in Nicaragua.

CAPT. ROMAYNE S. BAKER, member of the independent producing firm of Noble & Baker, Houston, Tex., has been made post secretary of the basic flying school in Enid, Okla., to which he was assigned recently. He received his commission last May after graduating from the officers' training school at Miami Beach, Fla. His partner, also a captain in the Air Corps, is stationed at Florence Field, South Carolina.

E. H. SHERIDAN, drilling foreman for Shell Oil Co., Inc., in the Mercy district of Texas, was honor guest, along with the employes of rig No. 2, at a barbecue given by the company signalizing 2 years without lost-time accident. Among the guests were E. C. LAWRY, South Texas division manager; G. D. ROBERTSON, division exploitation engineer; C. E. LEE, drilling superintendent, and J. A. GAVIN, area safety engineer.



MARKET DEVELOPMENTS . . .

East Coast

NEW YORK.—War price and rationing boards this week resumed issuance of "B" and "C" supplemental gasoline rations in the eastern states under a new and tougher policy.

Boards were instructed to examine each new application with extreme care and to hold supplemental rations to the absolute minimum. Value of "B" and "C" coupons was cut from 4 to 3 gal. each in the 17 eastern states and the District of Columbia earlier this month because of the increasing gravity of the supply situation.

Heavy demands on East Coast stocks continued this week and caused suppliers to dip deeper into inventories, according to preliminary reports. The drain was particularly heavy on residual fuel oil, kerosene and crude. Shipments of crude oil and products during the week ended December 19 averaged 744,023 bbl. daily, compared with 736,099 bbl. daily in the previous week.

An additional burden was thrust on the railroads last week by cessation of shipping on the Great Lakes and through the New York barge canal. An emergency pipe line, it was announced by the petroleum administrator in Washington, is being rushed into service between Tiffin and Akron, Ohio, permitting daily movement of about 15,000 bbl. of petroleum products into the East Coast area. Tank cars previously used for shuttling supplies between the two Ohio points will become available for other service, effective January 1 with operation of the new line.

Primary suppliers serving the East Coast this week awaited revised maximum quotas from the petroleum administrator, continuing a program launched in the middle of December when acute shortages forced complete stoppage of gasoline sales for a few days. Each refiner and primary distributor operating in the East Coast had definite quotas assigned during the last half of December, limiting the volume of each product authorized for sale.

Mid-Continent

SELLERS continued this week in control of the Mid-Continent refinery market as buyers throughout the Middle West and East to the Atlantic sought additional supplies of fuel oil and increased their efforts to line up forward purchases of gasoline for delivery next spring and summer.

Refiners are uninterested in selling motor-fuel more than 30 days ahead of current shipping schedules and most suppliers are reluctant to make commitments on firm prices that far forward. Numerous sales have been reported in recent weeks for next spring shipment but the terms call for the quoted market at time of loading. Rumors became more general this week but apparently without more reliable foundation that the Office of Price Administration is considering authorization for higher petroleum prices. These rumors, baseless as they may be, are enough to keep refiners from contracting more than 30 days ahead of the shipping schedules.

Liberalization of fuel-oil rationing in the Middle West and eastern states by permitting ahead-of-schedule use of coupons stimulated the call on primary suppliers.

Refiners declared motor-fuel stocks are at practical working minimums in the Mid-Continent area and that regular customers are calling for uninterrupted deliveries against contracts. Evidence is growing in the Middle West that rationing boards are giving full consideration to the insufficiency of public transportation and are, therefore, issuing supplemental rations to most automobile owners who can show a reasonable need for more than the basic-mileage quota of 4 gal. per week.

Natural gasoline demand continues to exceed currently available supplies and buyers are paying the present market without protest. Chief concern of purchasers under present conditions is to locate the supplies.

SENTENCE SUMMARIES

MID-CONTINENT: Purchasers actively seeking more gasoline and fuel oil at prerationing prices. Forward purchases discouraged by refiners.

EAST COAST: Refiners now working under maximum deliverable quotas, representing estimates of available supplies.

GULF COAST: Slump in local gasoline demand offset by overland shipments to eastern states and against lend-lease contracts.

PACIFIC COAST: Market for motor fuel unchanged. Demand for fuel oils is again increasing; prices steady on all products.

PENNSYLVANIA: Refiners drawing on stored crude in order to meet operating commitments. Prices steady and accepted without resistance.

A.P.I. REFINERY REPORT

For Week Ended December 19, 1942
(Figures in thousands of barrels)

	Dly. crude runs to stills	Stocks: Gasoline	Residual	Gas oil
Appalachian	149	2,693	436	708
Ind., Ill., Ky.	713	14,094	2,030	5,699
Okla., Kans., Mo.	360	6,089	1,289	1,908
Censored area*	1,863	36,650	14,412	†24,501
Rockies	94	1,442	529	358
California	688	18,163	55,509	12,706
Total Dec. 19, 1942	3,867	78,131	74,205	45,880
Total Dec. 12, 1942	3,744	77,622	74,785	47,794
Total Dec. 20, 1941	4,077	92,806	94,216	50,806

Note: Refinery runs and stocks for week ended December 26, 1942, appear on Trends page.

*Reports combined on East Coast, Texas Gulf, Louisiana-Arkansas and Inland Texas at request of PAW.

†Approximately 250,000 bbl. of indicated decline owing to earmarking that amount for Government.

CRUDE-OIL STOCKS

(Bureau of Mines Estimate)

Week ended:	Bbl. of crude*
December 19, 1942	231,742,000
December 12, 1942	231,896,000
December 20, 1941	243,617,000

*Excludes heavy, unrefinable stocks in California.

Gulf Coast

HOUSTON, Tex.—Notwithstanding the drop in demand since country-wide rationing went into effect, gasoline was exhibiting moderately rising strength in the Gulf Coast territory this week. To the surprise of dealers, no burdensome accumulations of motor fuel are reported. On the contrary, stocks in general are described as low. Here and there a marketer has had to shop around to get material needed to fill orders. Plants with larger inventories than desired are said to be, for the most part, those which have not been able yet to complete their specifications owing to delay in obtaining needed blending agents. In none of these cases, however, is serious concern manifested.

Steadiness of the motor-fuel market in the face of decreasing consumption by the family car is attributed to the fact that important refiners in this area have switched to the manufacture of aviation-base material. Several large plants in the Corpus Christi district are reported to have made this conversion, thus removing from the market their former output of regular-grade fuel.

Lubricating oils present the weakest spot among the refined-oil products, but even here inquiry reveals no specific instances of price reduction. A sharp falling off in automotive use of lubricants is self-evident, but factors pointed to as keeping manufacturers from lowering prices include curtailed output and the higher cost of labor, transportation and insurance. Opinion in the trade is divided as to how long the lubes will be able to maintain their present price levels.

In spite of recent measures designed to relieve congestion, transportation continues to be a major problem. The feeling prevails that improvement may be expected soon. Kerosene and the fuel oils remain exceedingly tight.

REFINERY AND TANK-WAGON PRICES

(Prices as of December 29)

Refinery Gasoline

Octane (A.S.T.M.):	†80	78	74.76	72-74	68-70	63-66	60 & lower
Mid-Continent*				5.875-6.000		5.500-5.625	5.125-5.250
Pennsylvania			6.750-7.000				
Gulf Coast‡	6.00-6.50			‖5.750-6.250	‖5.750-6.250	‖5.250-5.750	‖5.000-5.500
Northeast Coast	9.80			9.2	9.2		
Pacific Coast		6.500-7.000	6.250-6.500	6.125-6.250	5.750-6.000	5.125-5.250	4.750-5.000

*Basis Group 3. †1939 C.F.R. (research method). ‡Integrated companies restricted to lowest prices. ‖Unleaded.

Quotations are f.o.b. plant in cars and in cents per gallon except where otherwise noted. They are exclusive of the federal excise taxes of 1.5 cents a gallon on gasoline and 4.5 cents a gallon lubricating oils, and do not include marine lighterage charges.

Natural Gasoline

Grades:	26-70	18-55	75-85(350-375)
Oklahoma (Group 3)	3.875	4.650	
North Texas	3.500	4.200	
North Louisiana	3.625	4.350	
California			4.875-5.500

Kerosene and No. 1 Fuel Oil

Gravity:	46	45	42-44	41-43	38-40
Mid-Continent*			4.500	4.375	
North Louisiana				4.500-4.750	
Pennsylvania	6.250-6.625	6.125-6.250			
California				4.500-5.500	4.250
Northeast Coast				6.80	
Gulf Coast				3.875	

*Basis Oklahoma Group 3.

Tractor, Diesel, and Bunker Fuel Oil

Specifications:	46-48° G.	24 D.I.	48-52 D.I.	58 & above	Diesel bunkers	Bunker C
Mid-Continent*	4.125					
California		2.750-4.000			‡$1.35-1.45	$0.85-0.90
Gulf Coast			4.000	4.125	1.45	0.85
Northeast Coast				6.800	2.780	1.65
North Louisiana						†0.80-0.85

*Basis Oklahoma Group 3. †10-14° gravity. ‡Pacific Specification 200.

Furnace Oil, Gas Oil, Fuel Oil

	No. 2	No. 3	No. 5	No. 6
Mid-Continent*	3.625-3.750	3.500-3.625	$0.85	$0.80
Pennsylvania (West)	5.875-6.125	5.875-6.000	†5.250-5.500	
Northeast Coast	6.7	6.7	1.95	1.65
Pacific Coast	5.5	5.5	‡0.80-95	‖0.80
Gulf Coast	3.875-40		1.65	0.85

*Basis Oklahoma Group 3. †36-40 gravity fuel oil. ‡Pacific Specification 300. ‖Pacific Specification 400.

Lubricating Oils

Bright and Steam Refined

OKLAHOMA (Group 3)—		
200-210 D, 10-25		27.00
150-160 D, 0-10		23.00
120-125 D, 0-10		22.00
Steam refined:		
600 dark green (untreated)	9.00	9.50
PENNSYLVANIA—		
Bright Stocks (Pennsylvania Grade No. 8 color, 140-150 at 210, 545-550 flash):		
10 pour point		30.50
15 pour point		29.50
25 pour point	25.00	28.00
Steam refined:		
600	15.00	16.00
650	15.50	16.50
600 flash	16.00	17.50
630 flash	17.00	17.50

Neutral Oil

(Vis. at 100° F. except Pennsylvania and color N.G.A.)

OKLAHOMA (Group 3)—	
0-10 pour point:	
200-3	15.00
300-3	18.00
500-3	19.50
600-3	20.00

Note: Viscous neutrals, 10-25 pour, quoted 0.5 cent under 0-10 oils.

Wax

(Cents per pound)

OKLAHOMA (Group 3)—	
124-126 (A.m.p.) w.c. scale	4.250
PENNSYLVANIA (inlcnd refineries)—	
122-124 (A.m.p.) w.c. scale	4.250
124-126 (A.m.p.) w.c. scale	4.250

Neutral Oil

CALIFORNIA—		
Pale oils:		
200-2½-3	7.00	7.75
400-3-4	7.25	8.00
600-3-4	8.75	11.00
Red oils:		
200-4-5	7.00	7.75
400-5-6	9.00	11.00
500-900, 5-6½	9.25	11.25
GULF COAST—		
Pale oils:		
200-3	8.50	8.75
300-3	9.00	9.25
500-3½	9.75	10.00
750-3½	10.00	10.25
2,000-4	10.50	10.75
3,000-4	12.25	12.50
PENNSYLVANIA—		
150 vis. at 70° F., 3 color, 400-405 flash:		
Zero pour point		37.50
10 pour point		36.50
15 pour point		35.50
25 pour point		30.00
200 vis. at 70° F., 3 color:		
Zero pour point		39.50
10 pour point		38.50
15 pour point		37.50
25 pour point		32.00
NEW YORK—		
Wax in bags fully refined:		
130-132 (A.m.p.) wax		5.850
133-135 (A.m.p.) wax		6.150
Crude scale:		
124-126 (A.m.p.) w.s.		4.250
124-126 (A.m.p.) y.s.		4.250

EXPORT PRICES

Gasoline—60-62° Gravity, Maximum 400 End Point

Octane:	72-74	68-70	65-66	60
Gulf Coast	6.050	6.250-6.500	5.875	5.625
Pacific Coast		6.125-6.500	5.875-6.000	5.500-5.625

Distillate and Fuel Oil

	Kerosene	Diesel fuel			Bunker
	41-43	24 G.	48-52 D.I.	58 D.I. Bunkers	C grade
Gulf Coast	4.000-4.250		4.125-4.375	4.375 $1.65-80	$0.85-95
Pacific Coast	4.750-5.000	1.25-30		†1.35-45	*0.80-90

*Pacific Specification 400. †Pacific Specification 200.

Lubricating Oils

	Neutral oils		Bright and cylinder stocks		
	200-3	150-3	200-3	150-3	600&630 S.R.
Mid-Continent	16.8		28.8	24.8	
Pennsylvania	43-50	41-46	36-37	36-37	26.5-27

GASOLINE AND KEROSENE TANK-WAGON PRICES IN 50 CITIES

(Gasoline prices based on regular grades, tax included, undivided dealer)

ATLANTIC AND NEW ENGLAND

(Socony-Vacuum Oil Co., Inc., and Atlantic Refining Co.)

	Dealer tank wagon	Combined tax	Kero. tank wag.
Baltimore, Md.	15.45	5.50	10.20
Boston, Mass.	14.90	4.50	9.50
Burlington, Vt.	16.90	5.50	....
Buffalo, N. Y.	16.20	5.50	10.30
Dover, Del.	16.70	5.50	11.20
Hartford, Conn.	15.60	4.50	....
Manchester, N. H.	17.30	5.50	10.50
Newark, N. J.	14.70	4.50	9.40
New York, N. Y.	16.10	5.50	9.50
Philadelphia, Pa.	16.20	5.50	11.65
Pittsburgh, Pa.	16.70	5.50	12.00
Portland, Me.	16.30	5.50	9.60
Providence, R. I.	15.00	4.50	9.30
Washington, D. C.	14.70	3.50	10.70
Average 14 cities	15.91	5.07	10.32

(All prices undivided dealer basis.)

CENTRAL

(Standard Oil Co. of Indiana, Standard Oil Co. of Ohio, Continental Oil Co. and Texas Co.)

	Dealer tank wagon	Combined tax	Kero. tank wag.
Chicago, Ill.	13.40	4.50	10.30
Cleveland, Ohio	15.00	5.50	*9.00
Dallas, Tex.	13.00	5.50	7.00
Des Moines, Iowa	14.40	4.50	9.80
Detroit, Mich.	14.40	4.50	9.60
Fargo, N. D.	16.90	5.50	11.30
Huron, S. D.	16.30	5.50	10.70
Indianapolis, Ind.	15.20	5.50	9.80
Little Rock, Ark.	17.50	8.00	10.00
Milwaukee, Wis.	16.10	5.50	10.50
Minneapolis, Minn.	15.40	5.50	10.30
Omaha, Neb.	15.40	6.50	9.80
Tulsa, Okla.	16.50	7.00	8.50
Wichita, Kans.	12.70	4.50	8.00
Average 14 cities	15.15	5.57	9.61

*Includes 1-cent state tax.

SOUTHEASTERN

(Standard Oil Companies of New Jersey, Kentucky, and Louisiana)

	Dealer tank wagon	Combined tax	Kero. tank wag.
Atlanta, Ga.	21.40	7.50	11.40
Birmingham, Ala.	18.50	8.50	9.00
Charleston, S. C.	18.45	7.50	....
Charleston, W. Va.	18.75	7.50	13.00
Charlotte, N. C.	19.60	7.50	11.00
Jacksonville, Fla.	21.40	8.50	10.40
Jackson, Miss.	17.50	7.50	8.50
Louisville, Ky.	16.50	6.50	8.50
Memphis, Tenn.	18.60	8.50	10.50
New Orleans, La.	16.75	8.50	*10.00
Norfolk, Va.	16.95	6.50	13.50
Average 11 cities	18.58	7.59	10.58

*Includes 1-cent state tax.

MIDWESTERN

(Continental Oil Co.)

	Dealer tank wagon	Combined tax	Kero. tank wag.
Albuquerque, N. M.	17.50	7.50	10.00
Boise, Idaho	20.10	6.50	16.50
Casper, Wyo.	17.00	5.50	12.00
Denver, Colo.	14.50	5.50	11.00
Helena, Mont.	17.00	6.50	13.00
Phoenix, Ariz.	18.50	6.50	12.50
Reno, Nev.	17.50	5.50	13.50
Salt Lake, Utah	18.50	6.50	14.50
Average 8 cities	17.58	6.25	12.88

PACIFIC COAST

(Standard Oil Co. of California)

	Dealer tank wagon	Combined tax	Kero. tank wag.
Portland, Ore.	17.00	6.50	13.50
San Francisco, Calif.	14.50	4.50	11.50
Seattle, Wash.	17.00	6.50	13.50
Average 3 cities	16.17	5.83	12.83
Average 50 cities	16.57	5.96	10.76
Average last week	16.57	5.96	10.76

Canadian Fields

(Continued from Page 244)

is resumption of Adanac Royalties 1, LSD 10, 19-21-3w5, deepening from 3,316 ft. Location is 1½ miles northwest of Atlas-British Dominion 2, the most northerly producer, and the test, now drilling in lower Benton, should, unless faulting occurs, get the Madison limestone at reasonable depth. Location is about ¾ mile east and a little south of Bonaventure Royalties 1, LSD 16, 24-21-4w5, now the most northerly active test in the field. The Bonaventure well is in upper Blairmore below 7,387 ft.

Keho Dome Prospect

In the Keho Lake area of southern Alberta, Keho Dome Oils is arranging to finance completion of its No. 1 well, LSD 5, 18-11-22w4, now standing at 2,500 ft. The company, which holds 1,164 acres, was organized at Barons, Alta., but has been partly financed by Portland and Seattle interests. The general area was tested some years ago by Hudson's Bay Oil & Gas Co., which encountered good showings at the Madison limestone contact in addition to a small commercial production in a stray sand in the overlying Benton shale. The hole is in good shape and the well is expected to get the producing horizon in another 1,000 ft.

CRUDE-OIL PRICES

Representative selected crude prices from all sections of the country appear below:

East Texas	$1.25
Conroe	1.43
Tepetate, Louisiana	1.18
Illinois basin	1.37
Pecos County, Texas	.95
Bradford, Pennsylvania	3.00
Van, Van Zandt County, Texas*	1.08

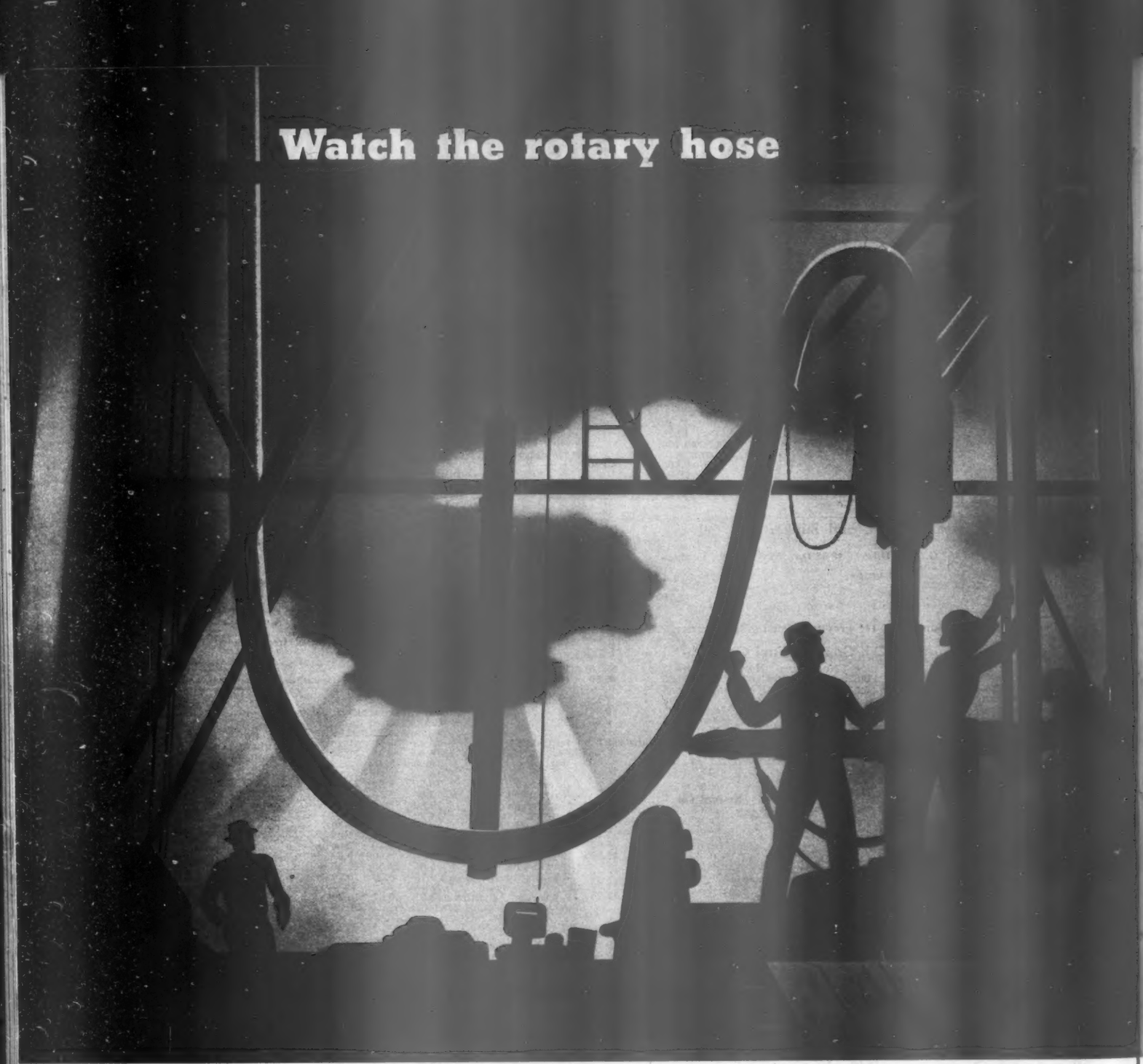
*No change since 5-21-41.

Gravity Schedules

Top prices include all gravities above grades designated, and low prices include all gravities below grades designated:

Gravity	Signal Hill, Calif.	Oklahoma, Kansas	Gulf Coast Texas	West Texas*
18-18.9	$0.80	....	....	....
19-19.9	.84	....	$1.06	$0.70
20-20.9	.88	$0.85	1.08	.72
21-21.9	.92	.87	1.10	.74
22-22.9	.96	.89	1.12	.76
23-23.9	1.00	.91	1.14	.78
24-24.9	1.03	.93	1.16	.80
25-25.9	1.07	.95	1.18	.82
26-26.9	1.11	.97	1.20	.84
27-27.9	1.15	.99	1.22	.86
28-28.9	1.18	1.01	1.24	.88
29-29.9	1.20	1.03	1.26	.90
30-30.9	1.23	1.05	1.28	.92
31-31.9	....	1.07	1.30	.94
32-32.9	....	1.09	1.32	.96
33-33.9	....	1.11	1.34	.98
34-34.9	....	1.13	1.36	1.00
35-35.9	....	1.15	1.38	1.02
36-36.9	....	1.17	1.40	1.04
37-37.9	....	1.19	1.42	1.06
38-38.9	....	1.21	1.44	1.08
39-39.9	....	1.23	1.46	1.10
40 and above	....	1.25	1.48	1.12

*Includes Lea County, New Mexico.



Information supplied by "Oil and Gas Journal"

The necessity for replacing rotary hose is more frequently due to abuse than to use. Here are some of the things which cause premature failure – and what to do about them:

Excessive vibration due to the pound of the pump. Stop it by maintaining pump valves and pistons in good condition and by installing a properly designed air chamber.

Rubbing against the hose by wire lines, derrick girts, tongs, etc. Protect it.

Most failures occur at either the swivel or stand pipe end of the rotary hose.

Reinforce the hose at these points or install a swing joint to absorb the shock of vibration.

Carelessness in moving. Provide suitable crate, box or reel.

Don't tie a winch line directly to the hose.

Oil rots hose. Don't permit contact with it. Wash hose inside and out with clean waste before storing.

If the hose does break, it can be spliced by the installation of 2 new connections. But it's better to avoid breaks by care.

CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS.
MOLYBDIC OXIDE BRIQUETTES • FERROMOLYBDENUM • "CALCIUM MOLYBDATE"

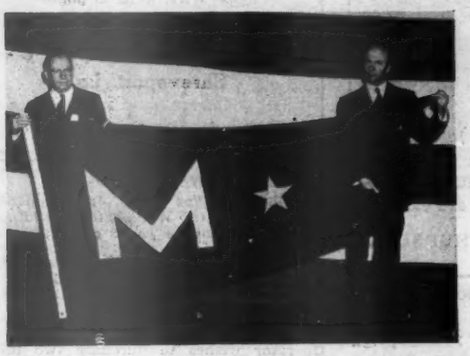
Climax Molybdenum Company
500 Fifth Avenue, New York City

MOLY

EQUIPMENT PROGRESS...

Superior Engine Division, National Supply, Receives Maritime Award

Presentation of the U. S. Maritime Commission awards in recognition of outstanding production



achievement was made to the Superior Engine Division of National Supply Co. at ceremonies held in Springfield, Ohio, on December 17.

A. E. Walker, president of National Supply Co., accepted the "M" Pennant and the Victory Fleet Flag from Rear Adm. H. L. Vickery, vice chairman, U. S. Maritime Commission, on behalf of the employes of the Superior Engine Division of the company.

Following the presentation of employe merit badges, which were accepted on behalf of the employes by P. J. Shouvlin, founder of the Superior Engine Co., refreshments were served to over 1,800 employes and their guests.

Double "E" Award Presented To Dow Chemical Co.

For accomplishing "more than seemed reasonable or possible" in the production of chemicals and metals for war, Dow Chemical Co. on December 29 received the unusual honor of two Army-Navy "E" pennants.

The products of Dow, one of the world's largest producers of industrial chemicals, are in use by every branch of the armed services.

A simple ceremony took place on the steps of the Dow administration building at Midland, Mich., at noon. Chief speaker was Maj. Gen. William N. Porter, chief Chemical Warfare Service, Washington, D. C.

Renewal Star for Broderick & Bascom's Army-Navy "E"

Continuing the high record of war production which earned the All-Navy "E" for them last April, employes

of Broderick & Bascom Rope Co., St. Louis, have won a renewal star from the Army and Navy. The added star—affixed to a new joint service flag, presented at a brief renewal ceremony on December 16—denotes extension of the honor for another 6 months.

Before an assemblage of employes at the change of No. 2 and No. 3 shifts, W. F. Veatch, commander of the Sixth Naval Reserve Area, handed the Army-Navy pennant to Charles E. Bascom, secretary-treasurer, who accepted it on behalf of the organization. Col. Merle H. Davis, chief of the St. Louis Ordnance District, pinned the new Army-Navy "E" employe badge on Henry Niemeier, representing his fellow workers. D. Larkin, vice president and general manager, presided and introduced the other Army and Navy officers in attendance.

AMONG EQUIPMENT MEN...

Graves Made General Manager Of D. W. Haering & Co., Inc.

D. W. Haering & Co., Inc., Chicago, announces the appointment of Howard B. Graves as general manager. Mr. Graves joined the company in 1934 as senior technologist and was formerly the St. Louis district manager. The company's research staff has recently announced the successful application of chrom glucosates for vapor-phase injection in conjunction with ammonia for complete inhibition of corrosion in refinery equipment.

H. B. GRAVES

The company's field and research engineers have developed a method of controlling corrosion in salt water and brines, making possible the use of iron and steel pipes to replace admiralty and high-alloy tubing in the petroleum and allied industries.

Research is also being directed to the control of wire-cable corrosion and additional experimental work is being carried out on cooling waters and condensate corrosion control. The use of organic glucosates for scale and corrosion control in dynamometer cooling rings has been an important contribution of its laboratory to the country's warplane-engine industry.

Abelt Elected Vice President and Director of Chain Belt Co.

At a recent meeting of the board of directors of Chain Belt Co., A. R. Abelt, secretary, was elected a director to replace F. J. Weschler, of the Baldwin-Duckworth division, who died last month. In addition to being made a director of the company, Mr. Abelt was also elected a vice president.

A. R. ABELT

A. R. Abelt joined the Chain Belt organization in 1907. He has served it in many capacities which have included production, sales and executive work. In 1922 he was made sales manager of the chain belt and transmission division, a position he retained until early in 1942 when he became manager of that division. He has been secretary of the company since 1930.

G. D. Gilbert, sales manager of the Baldwin-Duckworth division of the company, located at Springfield, Mass., has been made general manager of that division and also elected secretary of the company to succeed Mr. Abelt. Mr. Gilbert joined Duckworth Chain & Manufacturing Co. in 1918. He was made sales manager of that company in 1924 and was successively sales manager of the Baldwin-Duckworth Chain Corp. and the Baldwin-Duckworth division of Chain Belt Co. created by a merger of Baldwin-Duckworth and Chain Belt in 1939. He is also a director of Chain Belt Co.

B. DeLorenzo Appointed By Brown Fintube Co.

Brown Fintube Co., Elyria, Ohio, manufacturers of resistance-welded integrally bonded fintubes, and heat exchangers, has announced the appointment of B. DeLorenzo as manager of the heat-transfer department.

Mr. DeLorenzo graduated from the Massachusetts Institute of Technology in chemical engineering in 1930, and then spent an additional 2 years there in graduate study and research. He joined Foster Wheeler Corp., of New York, as laboratory technician in 1932, working on solvent refining of petroleum products, and since 1936 had been design engineer for Foster Wheeler in the oil division, specializing on heat transfers and flow of fluids.

Knight Given Promotion

Appointment of William H. Knight as director of sales and market research for the Elastic Stop Nut Corp. has been announced by Thomas H. Corpe, general sales manager of the company. The Elastic Stop Nut Corp., manufacturers of self-locking nuts, has plants in Union, N. J., and Lincoln, Neb.

Mr. Knight has had 20 years' exxperience in sales and marketing activities. He was formerly vice president of Electric Household Utilities Corp., Chicago, Ill. Prior to that he was a sales executive for 13 years for Firestone Tire & Rubber Co. of Akron, Ohio.

Key Co. Establishes Direct Representation in Southwest

Effective January 1, 1943, Key Co. will open its own district offices in the Southwest. The Houston office will be at 1315 Second National Bank Building, Houston, Tex., with J. H. (Jim) Richardson as district manager. The Tulsa office will be at 533 Mayo Building, Tulsa; M. J. (Max) Masel, district manager.

Key Co. was formerly represented in the Southwest by Koalt Engineering Co. of Tulsa.

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Patent Law Offices
418 Bowen Bldg., Washington, D. C.

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PRODUCING OR NONPRODUCING

Texas, New Mexico, Oklahoma, Louisiana and Illinois

20 Years' Experience

Inquiries Invited

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60 Broadview Drive, Clayton
St. Louis, Mo.

FOR SALE: Oil and Gas Leases on proven structures, drilling propositions, small production and fluospar deposits. Reports furnished. W. P. Harley, Bowling Green, Kentucky.

CRANE COUNTY, Tex., land nearby Gulf's drilling Sec. 2, B-28. Jefferson G. Smith, 215 Littlefield Bldg., Austin, Texas.

FOR SALE: Oil and gas leases North and South Dakota, ten cents acre. Owner. P. O. Box 1163, Tulsa, Oklahoma.

FOR OIL OR SALE: 480 acres, Sec. 340, Coke Co., Texas. 160 acres, Sec. 15, Tp. 16s R. 15, Plaquemines Parish, La. Owner J. Manz, Goddard, Kansas.

INDEPENDENT Operators: Acreage for sale in shallow gas proven area on basis of contracting all natural gas to present lease owner. Box B-402, The Oil and Gas Journal, Tulsa, Okla.

NEW MEXICO
State Oil and Gas Leases
Forty acres and multiples thereof. In a new HoT spot. 23 oil companies own surrounding leases. Write for information. No obligation. HARRY S. WRIGHT, New Mexico State Lessee, Farmington, N. M.

FOR SALE: 50 shallow producing wells in California. For attractive price, write owner, 649 So. Olive St., Room 1027, Los Angeles, Calif.

ATTENTION OPERATORS: Lease blocks for sale in gas area provided operators will contract all gas production to present owner. Box B-420, The Oil and Gas Journal, Tulsa, Okla.

Royalties

ANDREW J. BARRETT
The Philtower
Tulsa, Oklahoma.

WE BUY & SELL all types of Oil and Gas Royalties. Sales restricted to registered dealers only. Grimes Royalty Co., National Mutual Bldg., Tulsa, Okla.

Financing

CAPITAL SEEKERS — Interested in raising $25,000 or more for a legitimate project should write to AMSTER LEONARD, Fox Theater Bldg., Detroit, Mich.

INVESTORS YOU NEED? Organize Company. Contact Stockholders, Lease, Royalty Buyers. Cost Little. We furnish everything. Charter, Prospectus, Campaign, Leads. Faultless Organization, 3439 Michigan, Chicago.

Legal Blanks

THE BURKHART LINE of Legal Blanks Since 1908. Oil-Gas and Business Forms for Mid-Cont. and Illinois Basin. Leases Rev. with Gov.'s Regulations. Catalog and Samples. Burkhart Ptg. & Sta. Co., 115 So. Cincinnati, Tulsa, Okla.

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EFFECTIVE JANUARY 1, 1943

UNDISPLAYED RATE

8 CENTS A WORD, minimum charge $2 per insertion.

SITUATIONS WANTED. 4 cents a word, minimum charge $1.

BOX NUMBERS, count 9 words when replies are to be sent to our Tulsa Office.

10% DISCOUNT if 3 insertions are ordered at one time, with check accompanying order.

All classified advertising payable in advance.

DISPLAYED—PER INCH

Classified display advertising set in single or double column style:

1 inch	1 time	$7.00
1 inch	13 times	6.50
1 inch	26 times	6.00
1 inch	39 times	5.50
1 inch	52 times	5.00

Rates are governed by total space used within 12 months from date of first insertion. Credits are allowed when lower rates are earned.

FORMS CLOSE MONDAY NOON—PUBLISHED EACH THURSDAY

Incorporation

DELAWARE CHARTERS: Complete service $35. Submitted forms. Chas. G. Guyer, Inc., Wilmington, Delaware.

Help Wanted

NOTICE TO ADVERTISERS

Advertisers offering positions to workers skilled in critical war industries are requested by the War Manpower Commission to include the following sentence in their advertisement:

"Applications from those now employed in war industries will not be considered."

SEISMOGRAPH
Large company wants men between the ages of 18 and 40 for non-technical and for technical positions on Seismograph Field Parties. Men without technical education or experience in this or similar work start at 140.00 per month. Others start at higher salaries. For interview write giving experience, education, and other pertinent facts. Those liable for early induction or who are employed in prime war industries need not apply.
Write Box B-400, The Oil and Gas Journal
Tulsa, Oklahoma

WANTED: Field Superintendent or Farm Boss. Permanent position. Prefer man experienced in gas and water repressuring in shallow territory. State experience, draft status, and salary expected. Oko Oil & Gas Company, Iola, Kansas.

WANTED: Refinery engineer with several years experience in refinery design and layout. Should have knowledge of modern aviation gasoline manufacturing methods. Apply J. S. Walton, 871 Mills Bldg., San Francisco, Cal.

REFINERY SUPERINTENDENT: Capable of construction and operation of moderate sized plant. Good possibilities of expansion. Remote location. Mechanical knowledge desirable. Give details of training and experience. Box B-412, The Oil and Gas Journal, Tulsa, Okla.

ENGINEERS WANTED
Chemical or Mechanical with minimum one year oil refinery plant operation or maintenance experience. Require University Engineering School graduate with basic knowledge principles fluid flow. To work on process flow sheets, equipment selection and general handling oil refinery. Defense Contracts as assistant to senior engineers. No aliens or men engaged Defense work considered. Opportunity up to individual. In reply state experience, education, draft status, salary expected. Foster Wheeler Corporation, Room 2402, 165 Broadway, New York.

Manufacturer's representative known to the best trade, desired for quality oil field, plumbing and industrial specialties now being sold to quality trade; repeat items, excellent commission. Exclusive territories open. Write full details. Box 513, Equity, 113 West 42nd, New York.

Help Wanted

GLASS BLOWER for oil refinery near Houston must be able to handle pyrex glass. Work includes making multiple stage diffusion pumps and equivalent laboratory equipment. Salary. Transportation furnished. Send details personal history, experience to Box B-401, The Oil and Gas Journal, Tulsa, Okla.

Situations Wanted

INDUSTRIAL CHEMIST, six years petroleum refining and production experience, desires responsible position with permanent and substantial company. Married, protestant, draft 3-A, good character, dependable, practical. Available on two weeks notice. Box B-419, The Oil and Gas Journal, Tulsa, Okla.

MAN, 42, wide experience in all branches of oil production, desires permanent connection with active concern. Ten years with major company as executive landman. Box B-422, The Oil and Gas Journal, Tulsa, Okla.

WANTED: Diesel position in South America with progressive oil or power company. Diesel experienced at manufacturing, erecting, operating. Mechanical engineer, 38 years old, good health. M. D. Apelgrain, City Power House, Vero Beach, Florida.

PRODUCTION SUPERINTENDENT, now employed. Desires position with aggressive firm. 18 years experience. Flush and settled. Sand and limestone. Cable and rotary work. Good character, habits and references. Family, Age 36, 3A. For details, Box B-421, The Oil and Gas Journal, Tulsa, Okla.

Oil Industry Printing

OIL FIELD LEGAL BLANKS
Leases, assignments, releases, township plat books, well records, etc. Request on your letterhead gets free catalog. Olds Press 215 East Third St., Tulsa, Okla.

Business Opportunities

AM INTERESTED in contacting a drilling contractor who is having difficulty getting business. Have good contacts and can raise money and am interested in a deal on a 50-50 basis. If you have a similar idea, contact me and we will make a mutually profitable agreement. Or, if you have different plan maybe we can work something out of it. Box B-417, The Oil and Gas Journal, Tulsa, Okla.

Wanted

ANY information to the whereabouts of Bill Plunkett (Driller) formerly with the Carter Oil Co., South America, will be greatly appreciated. Address: Larry Kleen, 518 Wood St., Texarkana, Ark.

Money Raising

WANTED: Private capital to lay pipe line and distribution for natural gas to four small cities. Gas already proven and available. Box B-383, The Oil and Gas Journal, Tulsa, Okla.

Equipment Wanted

WANTED TO BUY

Pipe of all sizes, 2" to 16", inclusive, also refineries, pipe lines and abandoned wells. Wire, write or phone

Louisiana Iron & Supply Co.
Shreveport, La.

WANTED
Abandoned *Pipe Lines*, in or out of the ground, *Oil Wells*, *Steel Buildings* and Steel Storage *Tanks* of all sizes.

JOS. GREENSPON'S SON PIPE CORP.
National Stock Yards, St. Clair Co., Illinois.

PIPE OWNERS OR DEALERS
Operator wishes to purchase two miles 2 inch pipe suitable for gas line and pay for same from gas sales. Have the gas. Have the market. Box B-403, The Oil and Gas Journal, Tulsa, Okla.

WANTED TO BUY Marine Diesel Engines. What do you have to offer?
Industrial Supply & Equip. Co., Inc.
338 Baronne St., New Orleans, La.
RAymond 0889

WANTED: Spudders and Cable Rigs capable of drilling 1500 ft. to 6000 ft. complete with tools. Box B-395, The Oil and Gas Journal, Tulsa, Okla.

WANTED: Cardwell well servicing unit with spudder attachments. Suitable for 4500' depths. Would consider different make. Box 378, Cherryvale, Kansas.

WANTED: 1000 feet of 2⅞ in. P.K. Drill Rods. Must be in good condition. Box M-410, The Oil and Gas Journal, Tulsa, Okla.

DIESEL ENGINES
Total 1600 HP. required, with or without Generators. Consider units 225 HP. and larger. Also smaller high speed units for standby service. Preference given units immediately available. Give complete details and price. Address Purchasing Department. Box B-423, The Oil and Gas Journal, Tulsa, Okla.

For Sale—Equipment

FOR SALE: Three 100 h.p. Superior engines, with class B McCord lubricators at $2500.00 each. One Goulds pump $1200.00. Four 4x12 V.T.P.P. National Transit pumps. Write or wire PIPE AND MINING SUPPLY CO., 3063 Brighton Blvd., Denver, Colo.

FOR SALE—One complete steam rotary outfit less boilers, located near Coyle, Oklahoma, priced to sell. Inquire T. T. Eason and Company, Enid, Okla.

TANKS FOR SALE
220,000 gal. 43' x 20' Steel Tank. 1—14,000 gal. and 2—11,000 gal. and 1—8,000 gal. Steel Tanks. 12—9' x 8' Wood Tanks 2—10,500 bbl. 50' x 30' steel tanks with steel roofs.
L. M. STANHOPE
Wayne, Penna.

FOR SALE—One #6 Type D-1618 Marley Tapered Type Cooling Tower; capacity 600 GPM; priced right. Inquire Eason Oil Company, Enid, Okla.

5—7½"x20" Type VS, 500# W.P. Clark Compressor Cylinders complete with clearance pockets. Call or write Cimarron Gasoline Corp., Box 246, Coyle, Okla.

STEEL TANKS
2—6000 Gal. R.R. Car Tanks
4—17,300 Gal. 10'x29'6" horizontal.
2—20,150 Gal. 11'x28'6" horizontal.
220,000 Gal. 43'x20' Vertical
L. M. STANHOPE
Wayne, Penna.

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LYNCH REFINING COMPANY—KILGORE, TEXAS

We are offering for immediate sale this complete combination topping and cracking unit, gasoline plant, carload Ethyl plant, boilers, storage facilities, thirty-mile pipe line gathering system, located in heart of East Texas Field. Must be handled quickly. Wire, phone or write for details.

SONKEN-GALAMBA SUPPLY COMPANY

W. C. Berry
Union Ave. at 21st Street

Robt. W. Duden
Tulsa, Oklahoma

FOR SALE AT BARGAIN—1 complete rotary rig with Cardwell R.L. double drum drawworks and 7½x12 G.D. Pump, 160 HP Engines. Box 1439, Tulsa, Okla.

25 K.W. and 40 K.W. Gas Engines, 220 volts, D.C. Two 100 K.W. Gas Engine-Generator Sets, 220 volts, D.C. 7x8 Ingersoll-Rand ER-1 Air Compressor. Six-inch Oster Pipe Threading Machine. Also large stock of lathes, pipe machines, milling machines, etc. Send for our list.
Terms to suit.
CINCINNATI MACHINERY & SUPPLY CO.
26 West 2nd St., Cincinnati, Ohio.

FOR SALE — A large stock of reconditioned valves and fittings suitable for refinery and pipe line service. Inquire Eason Oil Company, Enid, Okla.

FOR SALE: 43 Joints 1290 feet New Youngstown 3½" OD 13.30# Grade D Smls Internal Upset Drill Pipe Range 2. Also 9 Joints 261 feet out of same string, slightly used, with Hinderliter FH 3 Way Pack-off Tool Joints on each joint. 78 Joints 2340 feet 5-7/16" OD 22.20# Youngstown Grade D Range 2 Internal Upset Seamless Drill Pipe with Reed FH Tool Joints on each joint. This string used but in first class used condition. Both strings situated on railroad siding at Wickett, Ward County, Texas. For prices write or wire A. R. Eppenauer, Pecos, Texas.

ROTARY EQUIPMENT FOR SALE:
4 4-Sheave Large Traveling Blocks with Hooks Attached
1 3-Sheave Small Traveling Block with Hook Attached
2 6" Swivels—Ideal & Emsco
1 4" Swivel—Oil Well
2 27½" Rotary Tables
2 5-Sheave Crown Blocks
2 4-Sheave Crown Blocks
1 150 H.P. Horizontal Fairbanks & Morse Diesel Engine, Model 47
Beardmore Drilling Company, Inc.
Wichita, Kansas

FOR SALE: Complete Wilson Portable Rotary Rig with telescoping mast, suitable for 2,000 ft. drilling. Melton Machinery & Supply Co., Seminole, Okla.

COUPLINGS: For Sale—2000 pcs. 5½" OD, 500 pcs. 7" OD, 100 pcs. 6⅝" OD. All 8 Round Thread, API Casg. New, Perfect, Mill Tested. JULIUS M. FOGELMAN, Reading, Penna.

2—120 HP, 650 RPM, rebuilt Diesel engines, power units.
1—200 HP, 514 RPM, completely rebuilt Diesel engine, power unit.
The two above can be supplied with Generators if desired.
2—66 HP Boilers.
1—75 HP variable speed A.C. motor.
Also variable sizes small alternating current motors.
K. S. RICHARDS
P.O. Box 443, Fort Worth, Texas
Phone 3-5600

FOR SALE: 27½" Ideal Rotary Table, 5 sheave 200 ton Crown Block, 4 sheave 72" traveling block, 8" Ideal enclosed rotary hook. Melton Machinery & Supply Co., Seminole, Okla.

FOR SALE: 11,000' 2" 4½# Used Lapweld Tubing; 6,000' ⅝x25' Used Sucker Rods; 5—100 bbl. Used Steel Bolted Tanks. Located at Pioneer, Texas. Keystone Production Co., Fort Worth, Texas.

FOR SALE: One 87 ft. API Size 11-A 20 ft. base American Steel & Derrick Company steel derrick with Type 66 steel legs, capacity 333,000 pounds, complete with bolts and crown safety platform. Used only a few months. In good condition. Located near Blackwell, Okla. Dave Morgan Oil Co., Box 549, Blackwell, Okla.

FOR SALE: 1—8x24, 10,000 gallon tank, 2—10x20, 12,000 gallon tanks. Tanks mounted on cradles and made of ¼" metal.
TESCO EQUIPMENT COMPANY
Box 1747, Abilene, Texas.

FOR SALE: About 30 tons of Angle Iron mixed sizes up to 4x4's inclusive. Quality, good clean and smooth; 500 GOOD used 2" Return Bends, Standard 125 lb. Screw End close, open and special wide pattern; 10 tons shafting and rods. Central Pipe & Supply Co., Phone 5851, Box 1442, Lubbock, Texas.

FOR SALE—Two 15x10 Chicago Pneumatic Compressors less motors or power units. In excellent condition, suitable for low pressure service. Inquire Eason Oil Company, Enid, Okla.

FOR SALE: Complete oil jobbing plant, 15 storage tanks about 11,500 gal. each, 4 horizontal. P.O. Box 284, Tulsa, Okla.

DIESEL—GAS—ENGINES
Large selection — All sizes and types. Generator units, marine engines, gasoline engines, auxiliaries—boilers, steam engines, and turbo-generator sets.
Complete information on request.
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48 Church Street, New York, N. Y.
Phone—Worth 2-0455-6-7

FOR SALE: Star Mfg. Company, portable cooling tower, telescoping type, 7' wide, 13' long, 8' high. All steel. Melton Machinery & Supply Co., Seminole, Okla.

FOR SALE—Two Cardwell model RL double drum well servicing units with spudder attachments complete with wire lines, light plants, cable tools and tool houses. Melton Machinery & Supply Co., Seminole, Okla.

FOR SALE: 50 wells producing approximately 40 barrels 35-36 gravity oil daily upon 1000 acres. 12 nonproducing wells. 10 miles 2" lead lines. 10 miles 2½" pipe line and much other equipment, including 5 good band wheel powers, lease tanks and several thousand feet of 1¼ to 6" pipe in supply yard. All lines painted when laid and now in first-class condition. Initial production 10 to 40 barrels per well. Also 1000 acres in trend of production and first-class steam drilling rig with 4000 feet good drill stem. Owner retiring. Don't write. Come and see. Alexander Boynton, 615 Insurance Bldg., San Antonio, Texas.

FOR SALE: 4—40 H.P. Superior 'Two Cycle' Gas Engines with reversible clutches. Good condition.
1—40 H.P. Fairbanks-Morse Diesel Engine. Vertical, type VA Model 32, with starting equipment. Good condition.
STROUBE & STROUBE
Corsicana, Texas

DIESEL ENGINES
Large selection — All sizes and types. Generator units, marine engines, gasoline engines, auxiliaries—also boilers, steam engines, turbo generators.
Complete information on request
A. G. SCHOONMAKER COMPANY
50 Church Street New York, N. Y.
Phone—Worth 2-0455-6-7

Second hand alloyed sucker rods, ⅞", ¾" and 1".
Sucker Rods, Fishing Tools, Tubing Spiders, Tubing Catchers, all sizes.
Structural Steel and Reinforcing Rods.
M. R. TRAVIS
1702 S. Boulder Tulsa, Oklahoma

FOR SALE—One partial list steam rotary equipment less boilers, rotary table, traveling block, swivel, located near Coyle, Oklahoma, priced right to sell. Inquire T. T. Eason and Company, Enid, Okla.

SPECIAL OFFER
IMMEDIATE SHIPMENT
OXYGEN-ACETYLENE WELDING HOSE SETS
Guaranteed—Heavy Duty
Standard Size—Double Braid
Samples furnished on request

Each set consists of OXYGEN hose (BLACK) and ACETYLENE hose (RED) with standard brass couplings attached to fit all makes of torches and gauges.

Length set	*Price per set*
12½ Ft. set	$ 3.10
25 Ft. set	5.80
50 Ft. set	10.80
75 Ft. set	15.80
100 Ft. set	20.80
Connector set	.30

Hose also furnished in continuous length reels of approximately 250 ft. and 500 ft. lengths.

OXYGEN HOSE	10c per ft.
ACETYLENE HOSE	10c per ft.
STANDARD COUPLINGS	15c each

Prices net—F.O.B. New York

CARLYLE RUBBER CO., Inc.
62 Park Place New York, N. Y.

FOR SALE: 4—7'x30' Ereco Absorbers, 16 tray, ⅝" shell, ⅜" heads. Welded.
1—3'x29' Ereco Absorber, 16 tray, ¼" shell, 5/16" heads. Welded. Also valves and fittings for gasoline plants.
1—4'x35' Tulsa Type Absorber, 14 trays, ⅝" shell, ¾" top head, 1¼" bottom head. W.P. 300#.
1—Ereco type fractionating still, sections 5' & 6'x43', 12 tray, welded. Shell ⅝", built-in reboiler, reflux condenser on top.
C. J. Smith, 532 Beacon Bldg.,
Phone 5-3416, Tulsa, Okla.

FOR SALE—Approx. 6500 ft. 6⅝" OD 25.20# drill pipe with Reed Full Hole Shrink Grip Tool Joints, A-1 condition. Inquire T. T. Eason and Company, Enid, Okla.

Fuel-Oil Ration Regulations Relaxed To Take Care of Vagaries in Weather

WASHINGTON, D. C.—Domestic heating-oil consumers in the 30-state eastern rationed area have been given two small grains of comfort by the OPA with regard to supplies for the rest of the winter.

In one, Administrator Leon Henderson said that the rationing program includes provisions for meeting abnormal demands likely to arise from sudden cold snaps at different points in the area, and in the second, OPA and ODT announced jointly that the application of mileage-rationing to petroleum delivery tank trucks was sufficiently flexible to permit retail deliveries frequently enough to provide customers with their share of limited supplies.

The "cold snap" statement was made after Mayor E. J. Kelly, Chicago, had conferred with him on the situation in his city, and OPA attaches said it was applicable to any part of the area where a similar exigency might occur.

Mayor Kelly asked for an increased allowance for Chicago householders because of the fact that December weather had been 42 per cent colder than the same month last year, and that allowances were being consumed more rapidly than contemplated.

He was told that consumers may use the oil necessary to maintain prescribed temperatures in their homes, and, although consumption might cut sharply into the amount allowed them for the entire season, an increase in value of the ration tickets would be made later to offset this. At present the coupons are worth 10 gal. each; later they may be made worth more, in order to take care of any abnormal demand.

In the other statement, issued by Mr. Henderson and Joseph B. Eastman, head of ODT, the two agencies said:

"Householders will have no difficulty in obtaining their share of the limited fuel-oil supply, and suppliers will be able to make all necessary deliveries, if consumers and suppliers will cooperate toward these ends. Steps taken in this connection, the statement said, include:

1. Under the ODT's mileage rationing program for commercial motor vehicles, which in general calls for a 25 per cent mileage reduction for tank trucks, simple procedure has been set up for the permanent adjustment of any truck allotments which may prove inadequate.

2. OPA has arranged its program to make generally unnecessary the delivery of small amounts of fuel oil, thus allowing suppliers to reduce the number of deliveries under ODT's conservation program. One way in which this is accomplished is through the "overlap" in validity dates of fuel-oil ration coupons, which makes it unnecessary for the householder to order any unused portion of his ration for a particular heating period before that period expires.

3. ODT has named subcommittees to the ODT state petroleum transport advisory committees, and directed them to draw up and submit for approval localized plans for the elimination of waste mileage in the distribution of fuel oil and other products.

However, the two agency chiefs urged consumers and suppliers to cooperate in the program by eliminating special deliveries and callbacks to cover blank stops, consumers giving suppliers at least 2 full days' advance notice on all orders for fuel oil, and waiting to place their orders until tanks are low, to allow delivery of a load equal to at least 75 per cent of tank capacity.

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CALENDAR

1943

February

NATIONAL OIL SCOUTS AND LANDMEN'S ASSOCIATION, business session, Dallas, Tex., February 4, 1943.

AMERICAN INSTITUTE OF MINING AND METALLURGICAL ENGINEERS, New York. February 15-18, 1943.

April

AMERICAN PETROLEUM INSTITUTE, Division of Production, Eastern district, William Penn Hotel, Pittsburgh, Pa., April 8-9, 1943.

AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS, annual meeting, Fort Worth, Tex., April 7-9.

May

PETROLEUM INDUSTRY ELECTRICAL ASSOCIATION, annual meeting, Houston, Tex., May 5-6, 1943.

Next Week

• Special section will give the first complete story of the 531-mile, 24-in. line from East Texas to Illinois, the initial leg of the petroleum industry's greatest pipe-line project. The description of the engineering, operating and economic features will be based on first-hand information obtained by staff members on the line and from men who have had leading parts in laying the line. Every important phase of the line construction will be illustrated.

• In the Engineering and Operating Section will be found the first of two articles outlining principles in job design, something new in the oil business, revealing the savings in expense as well as manpower, by a full analysis of the pumper's job.

• There will be many other interesting features in this first issue of the Journal in its new size, plans for which were previously announced.

Essentials for Safe, Economical Completions

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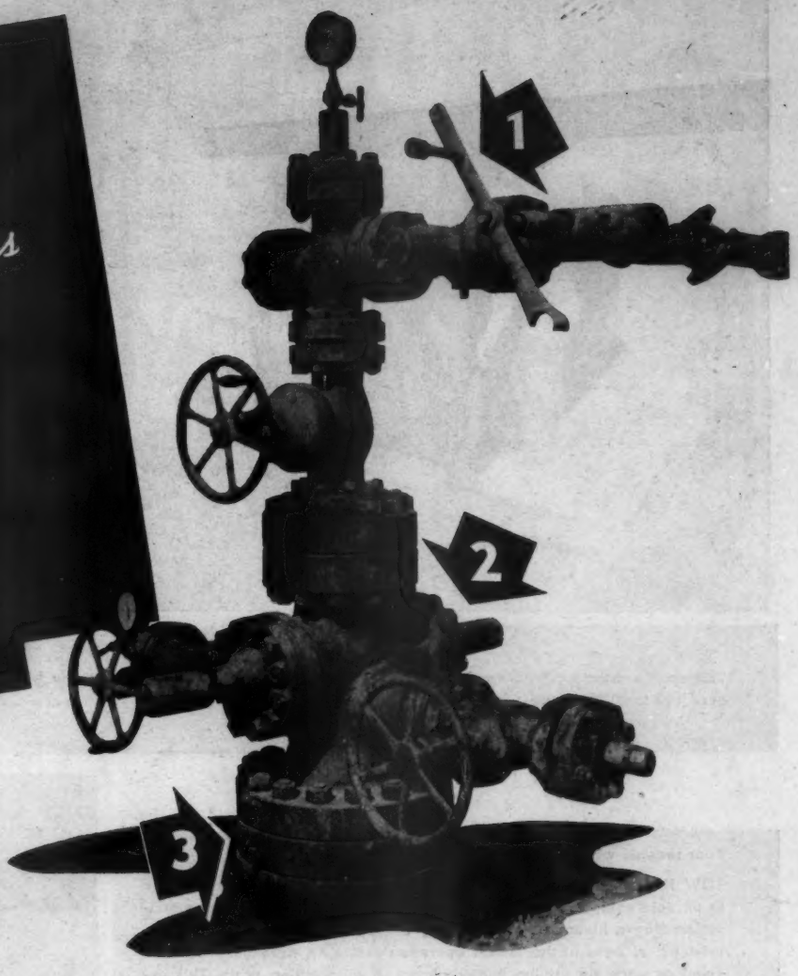


Featuring equipment which provides the ultimate in safe, dependable control during every step of the completion operation and which may later prove indispensable for reworking the well under pressure; numerous methods of suspending and sealing tubing and casing strings, all of which are interchangeable in a single tubing head or casing head housing; secondary plastic packing seals at vital points which may be safely repacked under pressure; and an innovation in flow wings—a unitized flow wing combining all necessary Xmas tree fittings in a single compact unit—Cameron Safety Xmas trees are truly head and shoulders above the field of completion equipment.

TYPE "D" FLOW WING

The Cameron Type "D" Flow Wing combines four Xmas tree fittings in a single compact unit: (1) A Xmas tree wing valve, (2) a quick change positive or adjustable choke, (3) a two-bolt flowline union, and (4) a bleeder connection. The valve section of the unit permits a quick and easily operated shut-off while changing chokes without the necessity of closing any vital valves on the tree. All parts for the assembly may be readily replaced in the field without removing the unit from the well.

RAM TYPE TUBING HEAD

The Cameron Type "LD" Ram Type Tubing Head provides the ultimate in safe, dependable control during every step of the completion operation. It provides three proven methods of suspending and sealing the tubing string, and obviates the need of a cement retainer when making a squeeze job. It is extremely practical on any reworking subsequent to original completion of the well. Its rams, equipped with Self-feeding Packing Elements, may be utilized for both suspending and sealing the tubing string. Note the plastic packing seal around each ram thrust screw, which may be safely repacked under pressure.

TEST FLANGE CASING HEAD

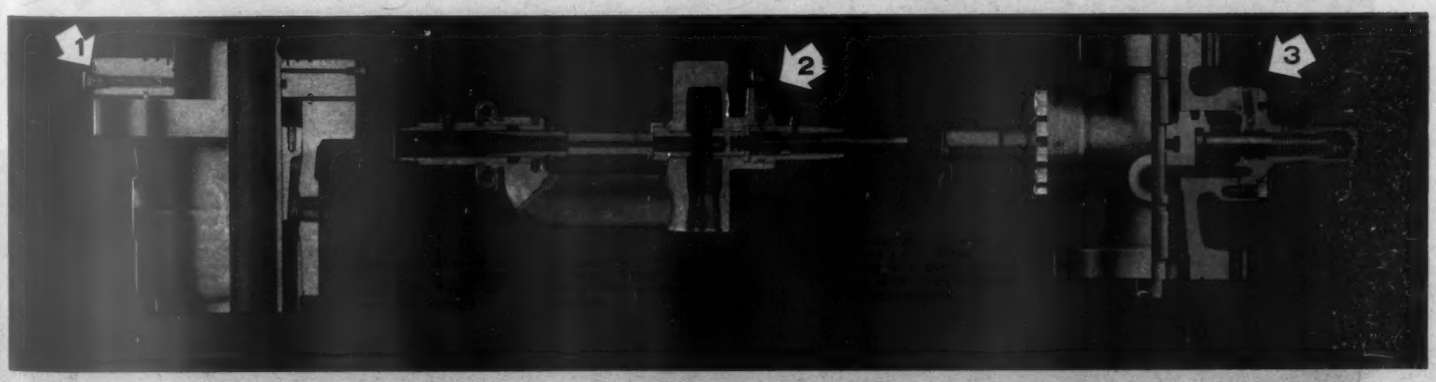
The Cameron Type "M" Test-Weld Flange, for use above Cameron Casing Head Housings and Spools, removes all doubt as to whether the space between casing strings is sealed. It provides double assurance against pressure leaks. A heavy weld between the welding flange and casing string is the first line of defense. The plastic packing seal below the weld permits the application of hydraulic testing pressure and provides a secondary pressure-tight seal which may be safely repacked under pressure should it ever become necessary.

Despite the incomparable safety and flexibility provided by these units, Cameron Safety Xmas Trees cost no more than ordinary Xmas trees. Complete details on the design and construction of this Cameron equipment will gladly be furnished on request.

CAMERON IRON WORKS, INC.

711 Milby Street — **Houston, Texas**

Export: 74 Trinity Place, New York, N. Y.
California: The Howard Supply Co., Los Angeles
Rocky Mountain: Rocky Mountain Sales & Service, Casper, Wyoming



This double drum rig with spudding assembly is available in three sizes for cable tool workover jobs to 10,000 feet.

RE
AND

"CARDWELL"

Only $580 for rotary table drive assembly changes this rig from a cable tool rig to a draw works.

Four reasons why a "Cardwell" will make you more money:

LOW INITIAL COST — MORE FOR YOUR MONEY — The biggest value in oil field equipment comes from "Cardwell". These rigs are not manufactured by a hit-or-miss method, they are designed so you can get the most out of them at the lowest operating costs. An average of $500 is spent on each rig for the heat-treatment of all wearing parts. This exclusive "Cardwell" feature saves you thousands of dollars in down time and repair parts. We know this to be a fact, because our records show that during an equal length of service, we supplied our early type rigs with twice the repair parts we do our present models performing the same operations. You get more for your money with "Cardwell" equipment.

OPERATES FASTER — You can count on saving time with a "Cardwell" from the moment you move it on location. There's no extra spotting or handling because the rig is compact and complete. When operating, the friction clutch driven drums save time and give easy control of the drill pipe or cable tools. The dual safety braking system operates with one-half the brake lever pressure ordinarily required.

DOES MORE JOBS — The rotary table drive assembly is interchangeable with the spudding assembly. This makes a combination rig that can be changed over in the field in three to four hours for either cable tool or rotary drilling and workover jobs. Each assembly makes this combination rig just as efficient as a single purpose rig and greatly increases its value. These rigs make a real investment for either the large operator or small contractor because they fit the job and keep going with a minimum of down time.

SERVICE WHEN YOU NEED IT — You can still count on "Cardwell" to give you the best oil field service. A 24-hour parts service, 365 days in the year, is maintained at the plant and at each of the ten strategically located parts stock stores in the United States. The ordering of replacement parts is simple because completely illustrated parts books covering every "Cardwell" machine are filed at the plant and a duplicate sent to the parts stock store in the territory in which the machine is delivered.

Three sizes of double drum combination drilling rigs are available for cable tool workover jobs to 10,000 feet and rotary workover jobs with tubing or light drill pipe to 10,000 feet. The same rigs can be used for cable tool drilling to 7,500 feet and rotary drilling with 4½-inch drill pipe to 5,000 feet.

CARDWELL ALLSTEEL

THIS TRADE MARK INSURES HIGHEST QUALITY AT LOWEST PRICE

CARDWELL MFG. CO. INC.

FORMERLY ALLSTEEL PRODUCTS MFG. CO.

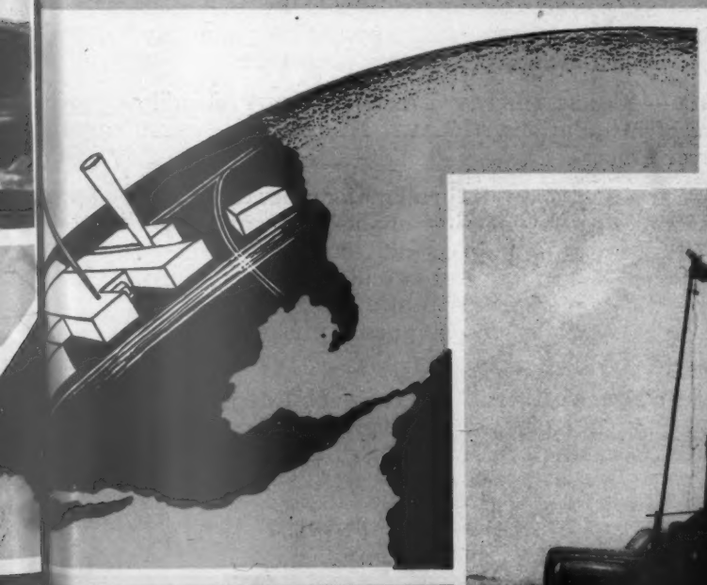
P. O. Drawer 3001 - Cable Addresses ALLSTEEL, WICHITA - CARDSTEEL, NEW YORK

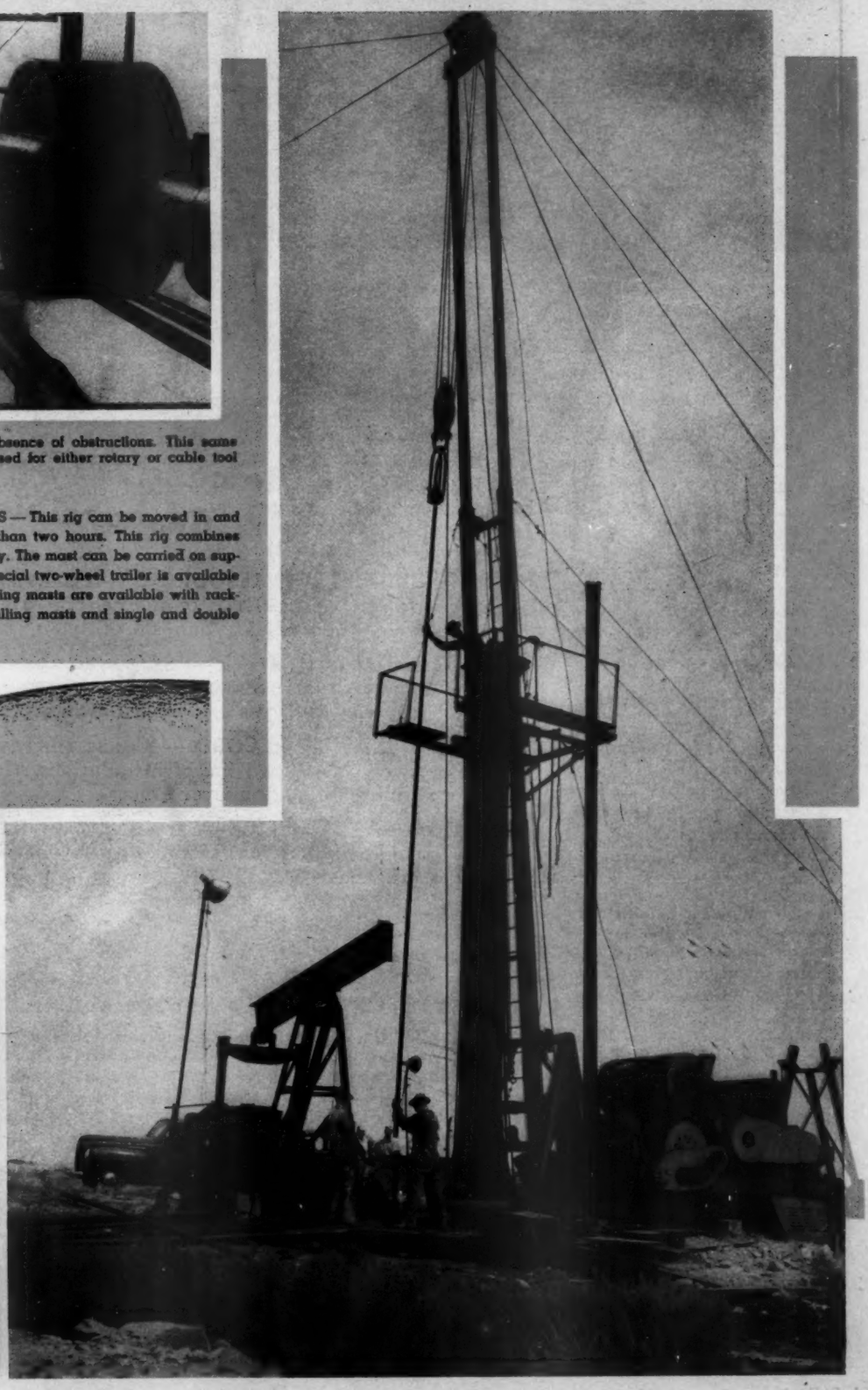
Wichita, Kansas, U. S. A.

HABILITATION WORKOVER JOBS

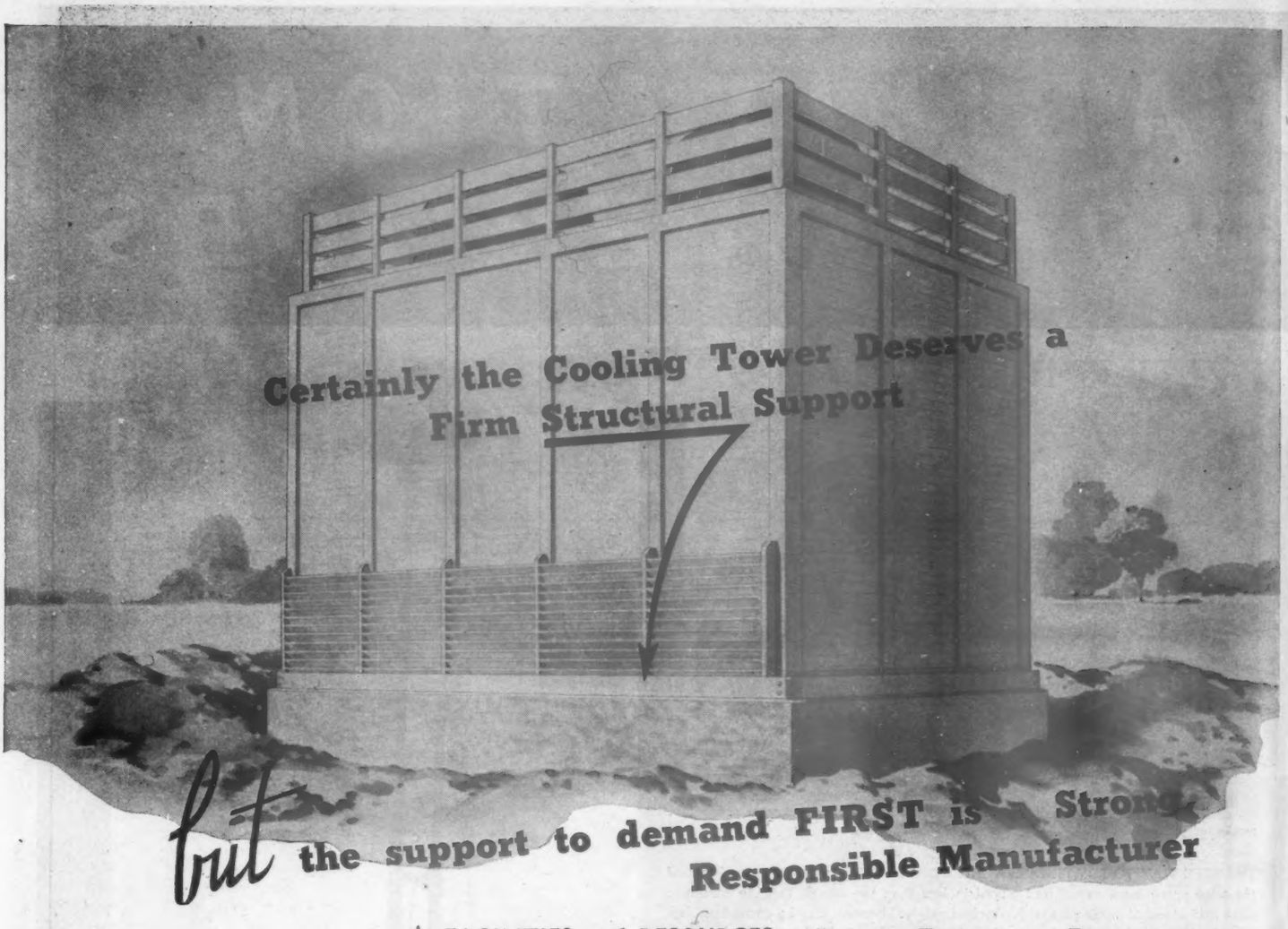
Looking up from the drilling floor. Notice the absence of obstructions. This same 65- or 87-foot double leg drilling mast can be used for either rotary or cable tool workover jobs.

THE SAFE WAY TO LOWER OPERATING COSTS — This rig can be moved in and the telescoping mast raised and guyed in less than two hours. This rig combines ease and speed of rigging up with absolute safety. The mast can be carried on supports and removed for derrick operations or a special two-wheel trailer is available for transporting. The 65 or 87-foot double leg drilling masts are available with racking platform. We have telescoping double leg drilling masts and single and double leg servicing masts for every "Cardwell" rig.





CARDWELL" RIGS
ARE STRONGER, WEAR LONGER
AND WEIGH LESS


Certainly the Cooling Tower Deserves a
Firm Structural Support
but the support to demand FIRST is a Strong
Responsible Manufacturer

The maker's background, integrity and ability to meet his commitments are just as much a part of the cooling tower purchase as any of its *physical* features. They are the vital protection against delays, troubles and less-than-rated performance that impede production of urgently needed war goods.

Even plants which will cease activities at the end of hostilities cannot afford to be without this protection... from the very start.

★ **FACILITIES and RESOURCES** — PLANTS, EQUIPMENT, PERSONNEL, INVENTORIES, ETC., of the calibre to execute *all* contracts of *any* magnitude *quickly* and smoothly.

★ **BROAD EXPERIENCE** — SEASONED PRODUCTS backed by the accumulated "know-how" of many hundreds of applications annually, covering all types and capacities in every variety of service.

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★ **COMPLETE SERVICE**—REPRESENTATIVES in all major cities to provide *confidential consultation* and engineering analysis of application problems. SOUND ADAPTATIONS to meet individual requirements and conditions. VETERAN ERECTION SUPERVISORS to direct fast, skilled installation by capable crews. WAREHOUSE STOCKS of replacement items. FIELD TEST SERVICE equipped to make operating studies.

★ **LEADERSHIP** — PROVEN DEVELOPMENTS both in general designs and component features. REPUTATION for originality and numerous "firsts." CONTINUOUS RESEARCH contributing to the advancement of the industry.

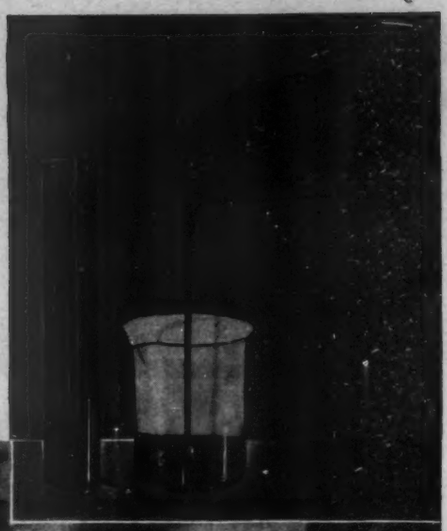
You know you get these from MARLEY
and you know it's worth the difference

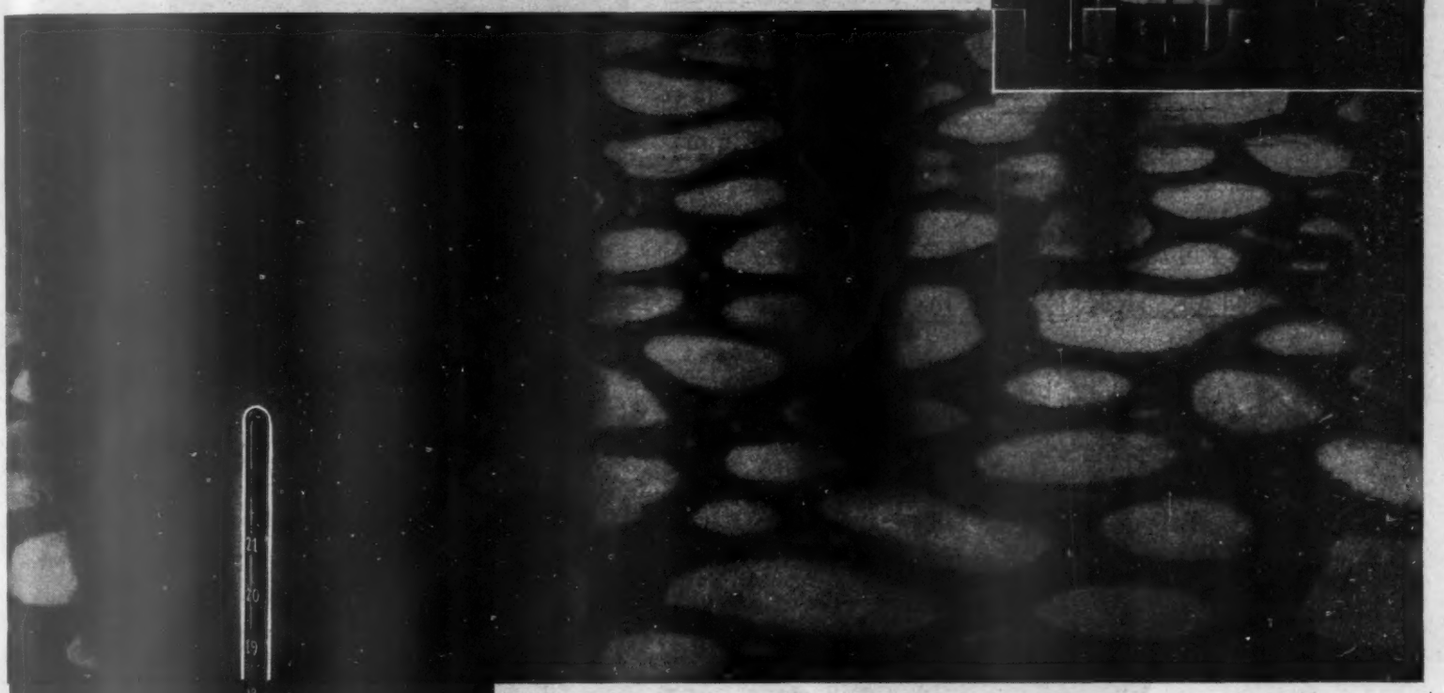
10-42-A

MARLEY COOLING TOWERS

Every MARLEY TOWER *is individually engineered by* THE MARLEY CO., INC. — KANSAS CITY, KANSAS

High Efficiency Dehydration for Low Gravity Crude Emulsions





Heavy crudes, so much in demand these days, often present a difficult treating problem. While the Petreco Electric Process effectively is dehydrating emulsions involving crudes over a wide gravity range, it always has been highly successful in treating low gravity crude oil emulsions.

Petreco engineers can point out many examples of Petreco performance on 12° to 22° API gravity oils. In some cases Petreco Electric treating has resulted in volume savings as high as 2% and 3%. Petreco's vapor-tight flow system allows the use of back-pressures to accelerate settling and prevents gassing and foaming. The Petreco Dehydrator is the only settling space required, conserving tankage. If you are a producer of heavy oil, check into Petreco Electric Dehydrating now . . . you'll find it worth-while.

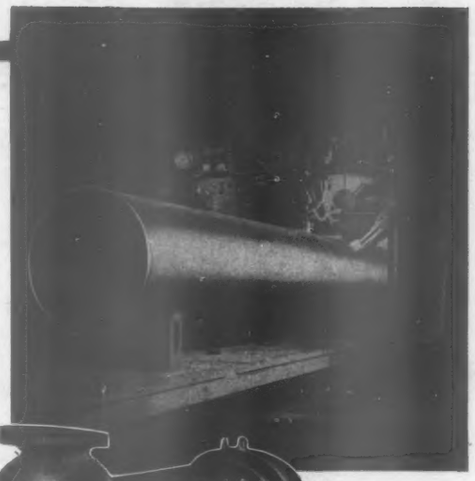
PETROLEUM RECTIFYING COMPANY OF CALIFORNIA
530 West Sixth Street, Los Angeles, California • 5121 South Wayside Drive, Houston, Texas
Edison Building, Toledo, Ohio

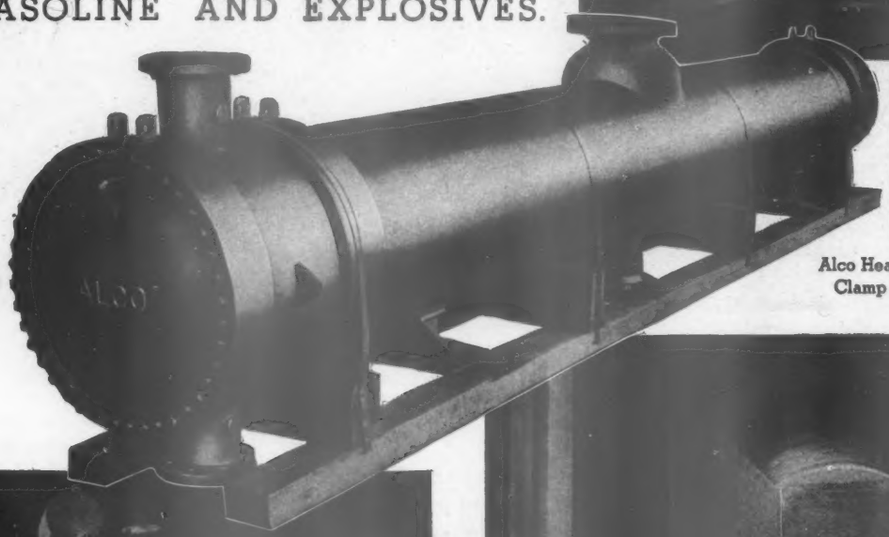
PETRECO
DEHYDRATING DESALTING

ALCO

EMPLOYING EVERY PRACTICABLE FACILITY FOR THE QUANTITY PRODUCTION OF TUBULAR HEAT EXCHANGERS REQUIRED FOR THE WAR PRODUCTION PROGRAM OF SYNTHETIC RUBBER, AVIATION GASOLINE AND EXPLOSIVES.

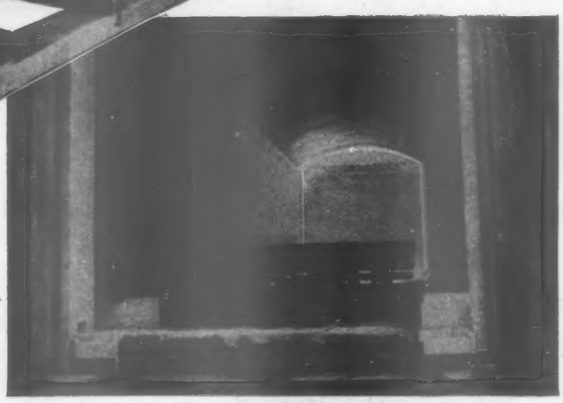
Automatic Welding Facilities



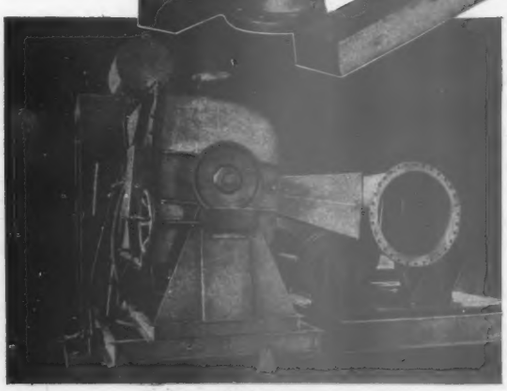


ALCO CLAMP RING JOINTS
Save 5 to 15% STEEL in HEAT EXCHANGERS

Alco Heat Exchanger
Clamp Ring Type



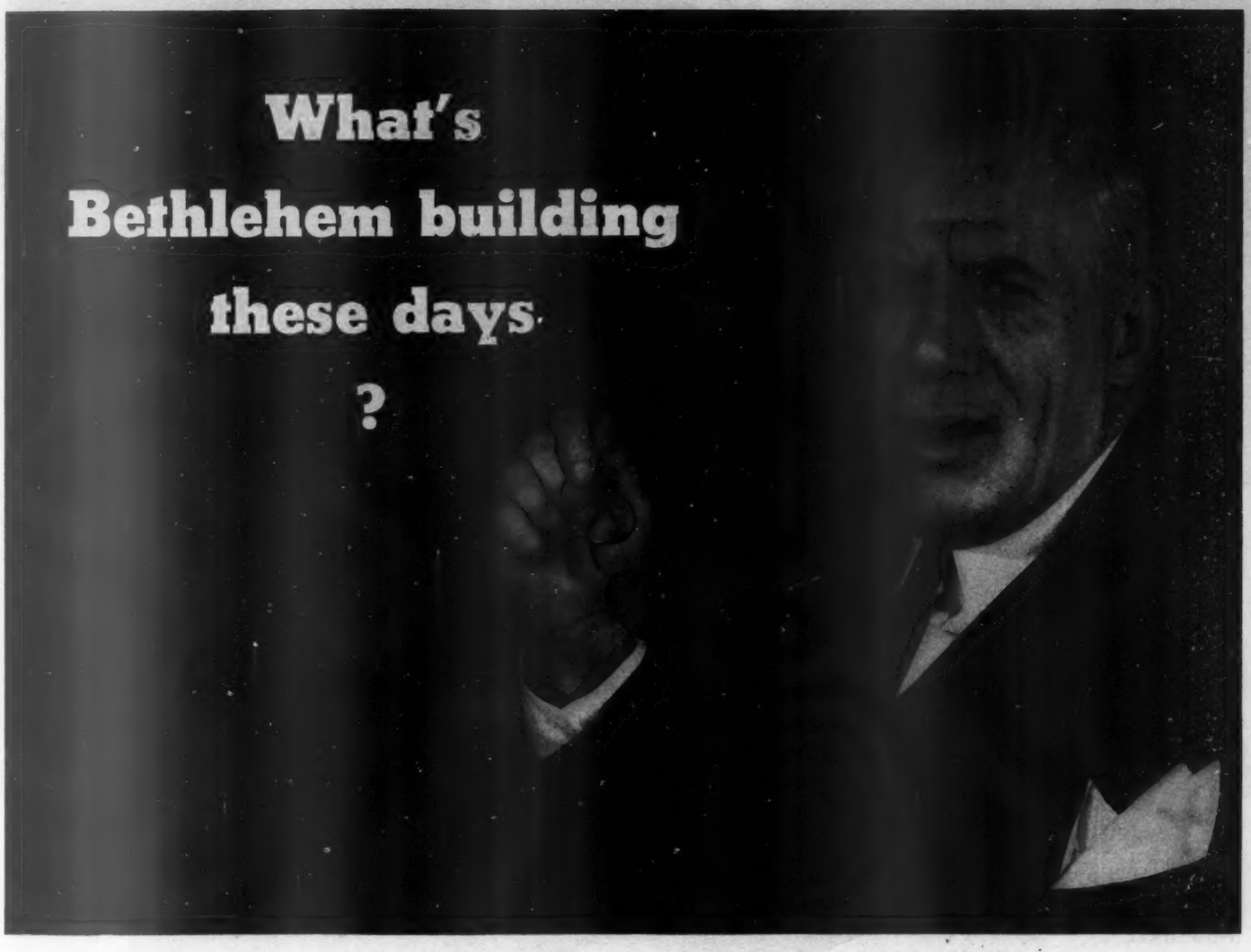
Stress Relieving Furnaces



Radiograph Equipment

For complete information regarding Alco Clamp Ring Construction obtain Bulletin No. 1032

AMERICAN LOCOMOTIVE COMPANY
ALCO PRODUCTS DIVISION
30 CHURCH ST., NEW YORK, N. Y. DUNKIRK, N. Y.



Today, every ton of steel that Bethlehem fabricates is in some way aiding in the war effort

For the oil industry, Bethlehem is right now fabricating and erecting steel for four 100-octane gasoline refineries, and is building tanks, telescopic gas holders, and other units for synthetic rubber plants. In addition, during the past year or so, Bethlehem has supplied many thousands of tons of fabricated steel for Army and Navy hangars and attendant buildings, and for bomber-assembly plants, tank arsenals, and various other types of war-production structures. The steel for many of these buildings was fabricated and erected in record time.

Bethlehem was well equipped to carry out this big program of construction. With the making of the steel and its fabrication and erection all handled within a single, well-coordinated organization, efficiency is increased and time saved on any steel construction job.

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY

WILSON RIGS HAVE 15 BIG FEATURES!

1. Flame Hardened, Ground and Polished Alloy Steel Brake Rings file hard!
2. Dynamically Balanced Drum and other Rotating parts.
3. Complete Instrument Panel with sliding door.
4. Cathead Safety Device to protect operator.
5. Cradle Mounted Hydromatic Brake with instant engaging clutch lever controlled from driller's position.
6. Clamp-On-Cover Oil Tite Chain Guards. On or off in a minute!
7. Rubber Cushion Mounted Shock Absorbing Chain Transmission.
8. Rubber Cushion Shock Absorbing Engine Clutches.
9. Full Circulating Water Cooled Friction Clutches in drum; same system cooling both brake and clutches.
10. Friction Latch on Brake Lever; perfect feeding without automatic feed control unit.
11. Internal Expanding (Patented) Shoe Type Clutch.
12. Automatic Friction Clutch Air Pressure Control System.
13. Safety Locking Bolts lock clutch spider to drum, and jaw clutch on counter shaft, insure positive drive.
14. Air Controlled Transmission with "speed lock" prevents shifting at speeds that would damage transmissions.
15. High and Low Speed Friction Drum Clutches; with Finger Tip Air Controls; and Manual Emergency Control.

"Wilson"

A Driller and his rig are like a gunner and his gun—they are close pals, these days. . . . If a gunner's gun "jams" in a pinch, the gunner is placed in a bad situation. . . . Similarly, when a driller's rig "lets down" under the strain of wartime operations, the driller is put in a predicament. . . . So it is important that both the gunner and the driller treat his equipment like a "pal" and be sure it performs when needed. . . . Fortunately, WILSON Power Rig owners have the advantage of operating rugged, long-life equipment, which performs with amazing efficiency under consistent grueling treatment. But even a WILSON Power Rig must be safeguarded, by keeping it in tip-top shape at all times. . . . Regardless of where you are—in the United States or South America—do these things: Keep your rig properly lubricated; operate it carefully and in a common sense manner; keep it in proper adjustment; and give it a thorough check-up and make necessary repairs frequently. . . . Just remember, a mighty driller is your WILSON. So keep it in fighting condition and prolong its life!

El perforador y su aparejo de perforación son como el soldado y su rifleson compañeros inseparables estos tiempos . . . Si se tranca el rifle en un momento de gran urgencia, el soldado quede expuesto a mortal peligro . . . y de igual manera, si se paraliza el aparejo, bajo la tensión de las necesidades de la guerra, el perforador enfrenta un serio problema. Tanto para el soldado como para el perforador, es de suma importancia tratar el equipo como un íntimo amigo, para que funcione bien cuando se le necesita . . . Por suerte, los dueños de aparejos mecánicos WILSON tienen la ventaja de valerse de un equipo seguro y muy durable, que funciona con sorprendente eficacia bajo las condiciones de trabajo más exigentes. Pero, a pesar de todo, hasta un aparejo mecánico WILSON debe protegerse, conservándolo, en todo momento, en condiciones de funcionamiento de primer orden . . . No importa dónde se encuentre, ya en los Estados Unidos de América, ya en la América Latina, haga Vd. lo siguiente: Mantenga bien lubricado su aparejo; acciónelo con cuidado y de una manera racional; consérvelo debidamente ajustado; examínelo con cuidado y repárelo oportunamente . . . Recuerde que su aparejo WILSON es un gran equipo de perforación. Manténgalo, por lo tanto, en buenas condiciones para prolongar su duración.

Wilson

MANUFACTURING COMPANY, INC. WICHITA FALLS • TEXAS

EXPORT REPRESENTATIVE • GUY E. DANIELS • 30 ROCKEFELLER PLAZA • NEW YORK CITY

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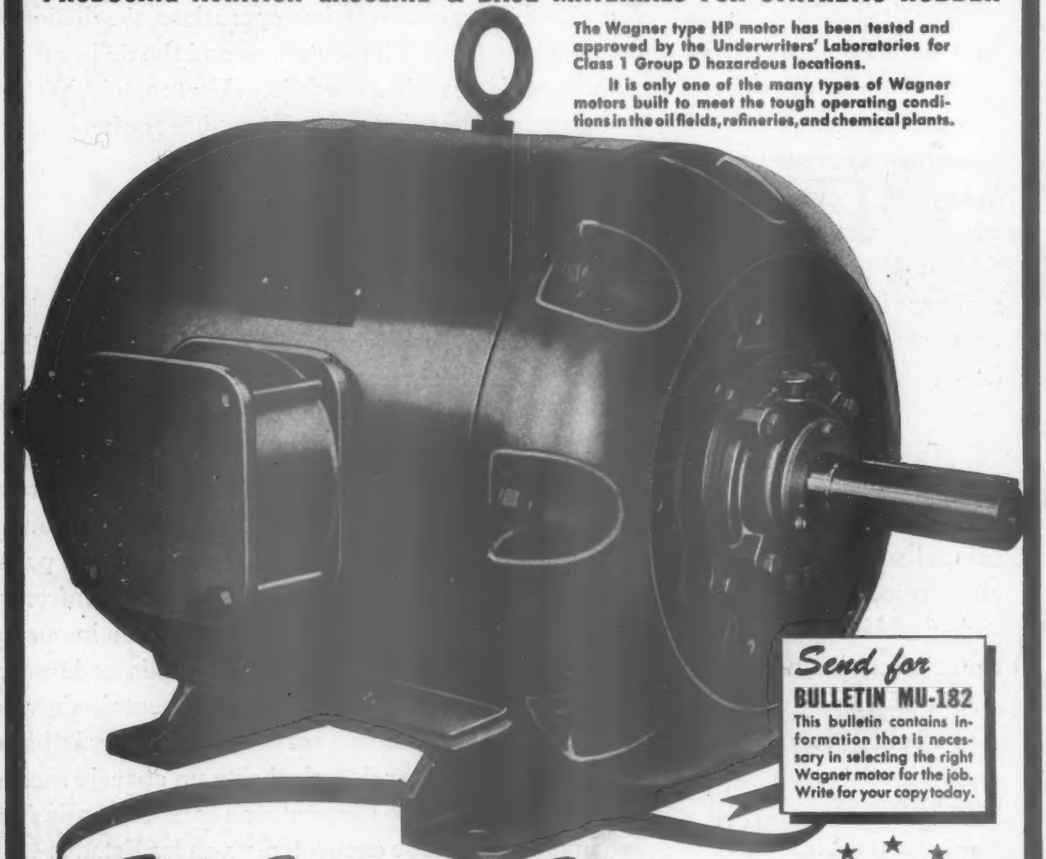
...rovide Safe, Dependable Drives

FOR ALL EQUIPMENT USED IN REFINING AND CHEMICAL PLANTS

PRODUCING AVIATION GASOLINE & BASE MATERIALS FOR SYNTHETIC RUBBER

The Wagner type HP motor has been tested and approved by the Underwriters' Laboratories for Class 1 Group D hazardous locations.

It is only one of the many types of Wagner motors built to meet the tough operating conditions in the oil fields, refineries, and chemical plants.



Send for

BULLETIN MU-182

This bulletin contains information that is necessary in selecting the right Wagner motor for the job. Write for your copy today.

Field Engineering Service . . .

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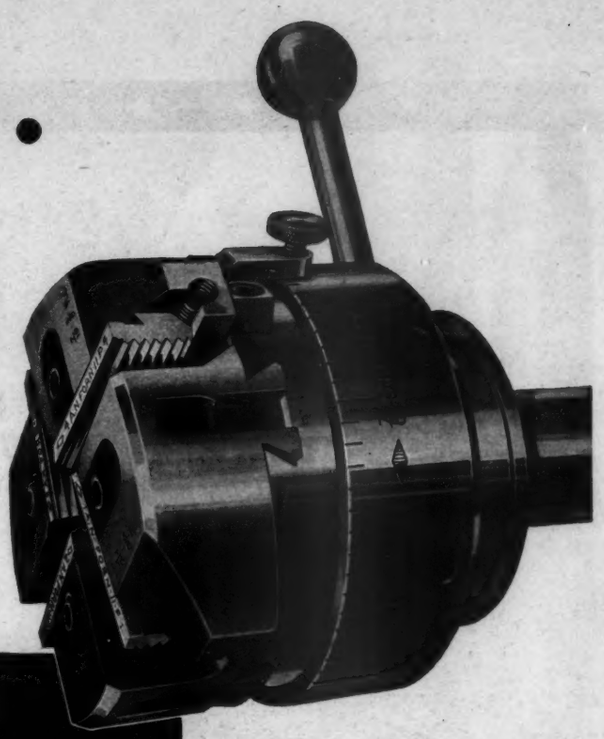
M42-15

MOTORS • TRANSFORMERS • FANS • BRAKES

LANDIS . .

THREADING EQUIPMENT WILL SOLVE YOUR PRODUCTION PROBLEMS

In all kinds of Industry—everywhere—LANDIS Die Heads and Threading Machines are setting the pace in the production of Threaded Components used in the manufacture of Vital War Matériel.



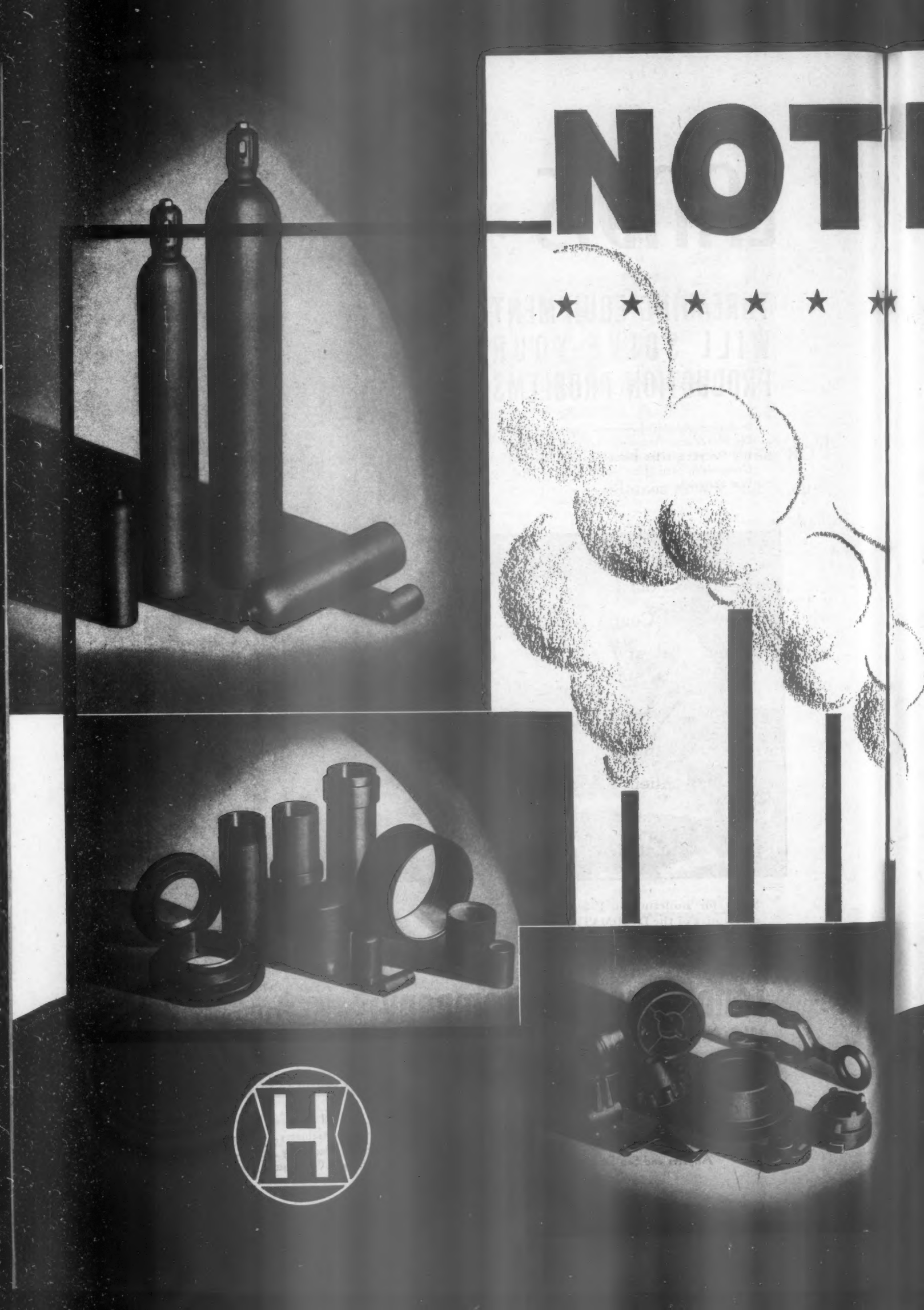
Write for Bulletin No. F-80-3 descriptive of the LANDMATIC Hardened and Ground Heads.

LANDIS MACHINE COMPANY
WAYNESBORO, PENNA., U. S. A.

LANDIS REG. U.S. TRADE — MARK PAT. OFF.

THREADING MACHINERY—THREAD CUTTING DIE HEADS—COLLAPSIBLE TAPS

REPRESENTED IN THE DOMESTIC OIL FIELDS BY:
Colcord-Wright Machinery & Supply Co., St. Louis, Mo., C. J. Harter Machinery, Houston, Texas; Murray-Baker-Frederic, Inc., New Orleans, La., Moore Machinery Co., Los Angeles and San Francisco, Calif., Hendrie & Bolthoff Mfg. & Supply Co., Denver, Colo.


NOT
H

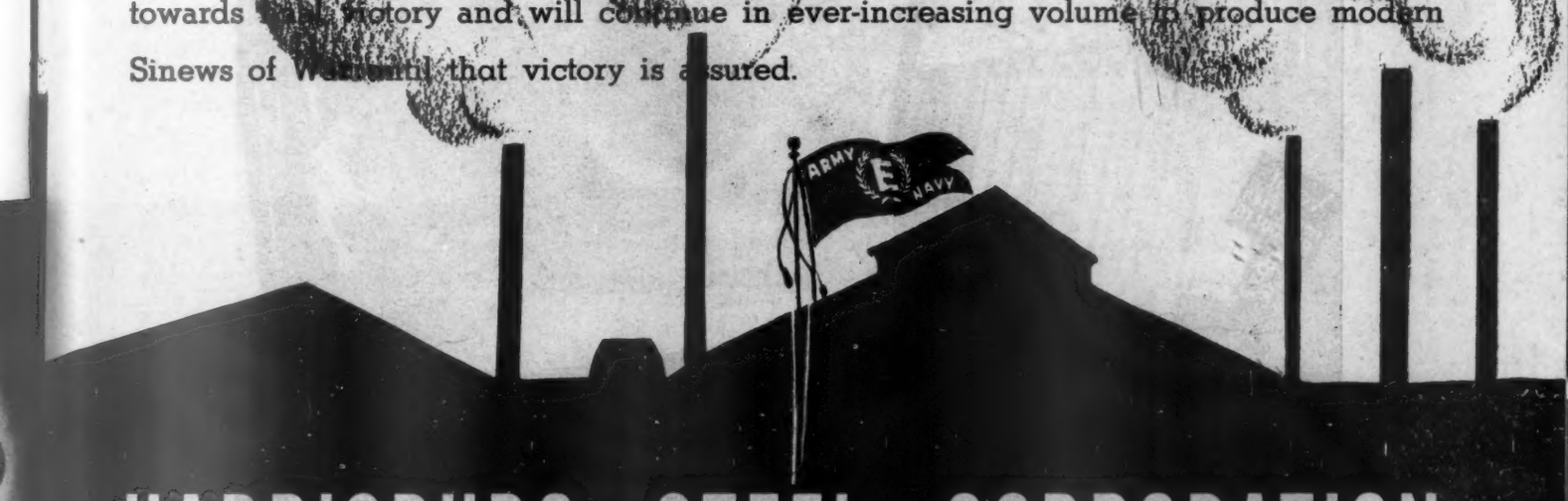
FOR SALE

BECAUSE WE HAVE SWITCHED 100% TO SINEWS OF WAR

FOR many years the Harrisburg Steel Corporation has been supplying the great petroleum industry with seamless and drop-forged steel products — products of proven quality made possible by long experience and intelligent supervision in every stage of manufacture.

But now we are all out for Uncle Sam. The men and machines that have supplied you with Seamless Steel Couplings, Pump Liners, Bull Plugs and Drop-forged Steel Flanges today turn out vital and much-needed munitions for the armed forces on far-flung battlefronts.

We know that Harrisburg's many customers in the Western Hemisphere want it this way .... for by your patience and understanding we have been able to contribute a share towards final victory and will continue in ever-increasing volume to produce modern Sinews of War until that victory is assured.



HARRISBURG STEEL CORPORATION

OF HARRISBURG, PENNSYLVANIA . . . who have been given the Army-Navy Production Award for high achievement in production

A.P.I.—A.S.M.E. and A.S.M.E. CODES • CARBON STEEL AND SPECIAL STEEL

WELDED PRODUCTS by Vogt

1 — 4′—0″ dia. x 7′—6″ dia. x 82′—5″ high Stabilizer Tower for a Texas Refinery. Fabricated to A.P.I.-A.S.M.E. Code, stress relieved and X-rayed. 250# working pressure.

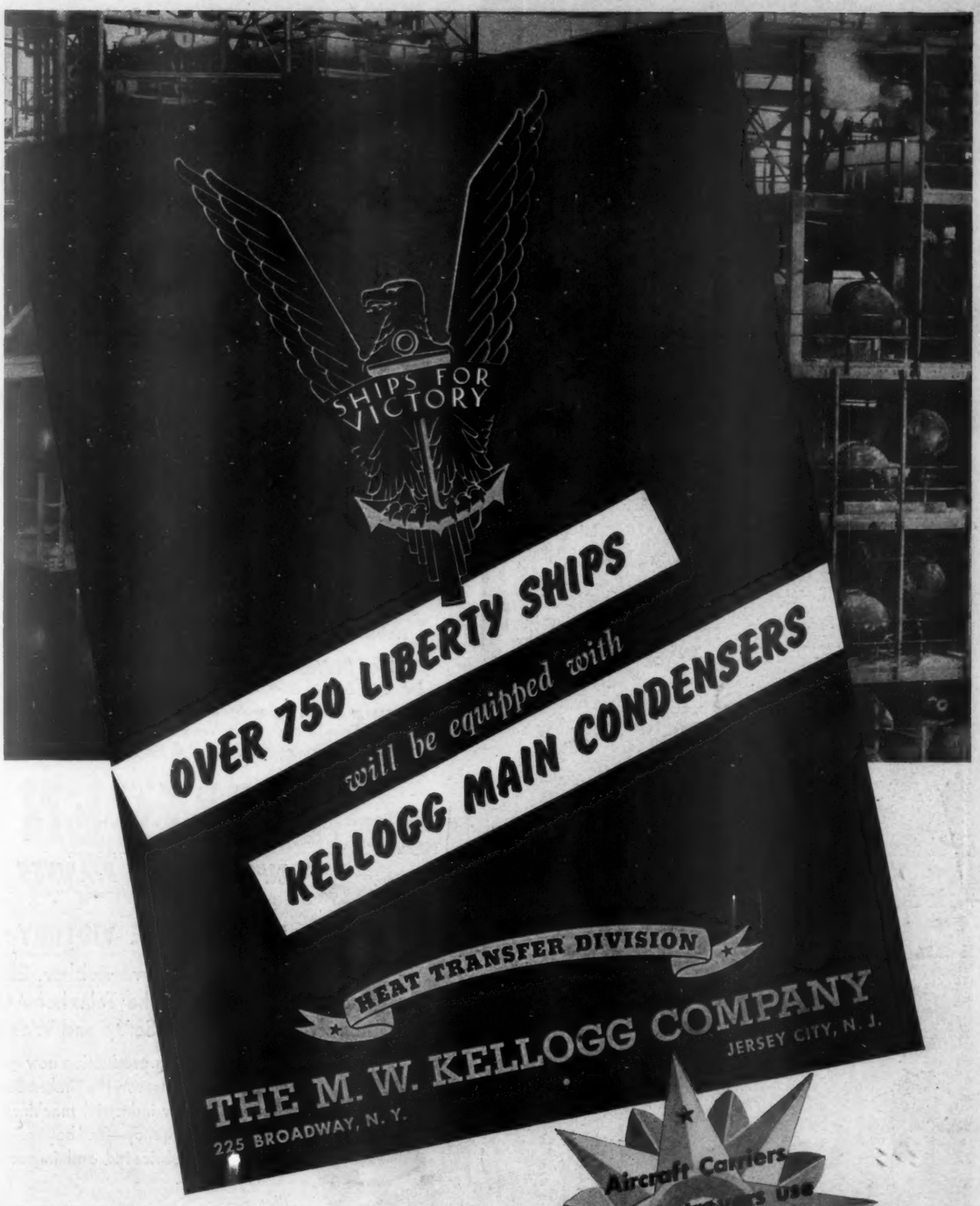
2 — Heat Exchangers, for an Eastern Refinery, on the testing floor. Units have fusion welded Monel Metal shells and were built to customer's specifications.

3 — 48″ dia. x 22′—6″ long mud drum for a Vogt Water Tube Boiler designed to operate at 450# S.W.P. Fusion welded to A.S.M.E. Boiler Code.

4 — Battery of Absorption Columns in a Western Refinery. Units are 33″ dia. x 41′—0″ high and were stress relieved after welding.

5 — 400 KV Industrial X-ray unit in our plate welding department. Exographs of welded seams can be quickly made because of the special motor operated rolls and traveling carriages which are adjustable to vessels of any size.

HENRY VOGT MACHINE CO.
Incorporated
LOUISVILLE, KENTUCKY
BRANCH OFFICES: NEW YORK · PHILADELPHIA · CLEVELAND · CHICAGO · DALLAS



Aircraft Carriers and Destroyers Use KELLOGG Prefabricated High Pressure Piping

KELLOGG THE M. W. KELLOGG COMPANY
JERSEY CITY, N. J. • 225 BROADWAY, N. Y.
Representatives:
LOS ANGELES: 809 SOUTH GRAND • TULSA: PHILTOWER BLDG.

"Masterflex" Prefabricated Piping Systems • "Masterweld" pressure vessels for Power, Refinery and Chemical Industries. Heat Exchangers. Pyrolytic and Catalytic Cracking Units, Reforming, Dehydrogenation, Alkylation, Desulphurization. Thermal and Catalytic Polymerization Units • JUIK Processes for Lubricating Oil Plants. Plastic Refractories • Radial Brick Chimneys.

The performance and endurance of any machine are improved by Timken Tapered Roller Bearings—even if only a few are used. But it's when these bearings are installed at every suitable position that their full value becomes evident.

Then all speed restrictions are removed as far as bearings are concerned; wear is reduced to the point of elimination; radial, thrust and combined loads are under complete control; moving parts are held in constant alignment. Added advantages are simplified and positive lubrication; and greatly reduced maintenance.

There's another point that designing engineers should keep in mind—if they don't they can't give their companies all they are entitled to. It is this: because "TIMKEN" is the best known name in bearings, Timken Bearing Equipped machines are not only *better* machines—but also *better selling* machines.

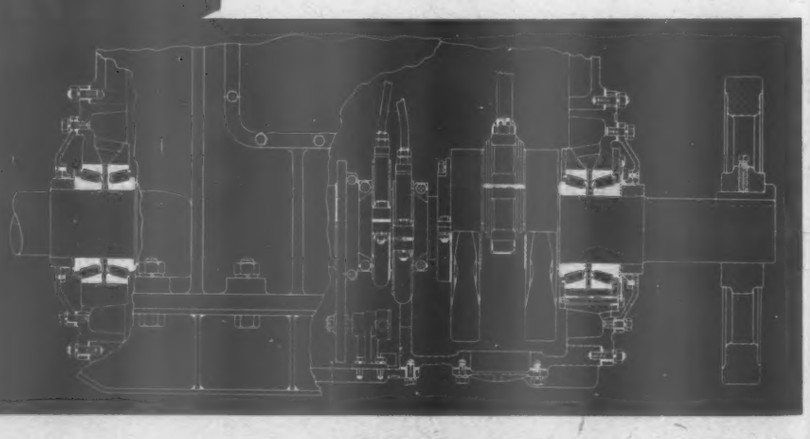
THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

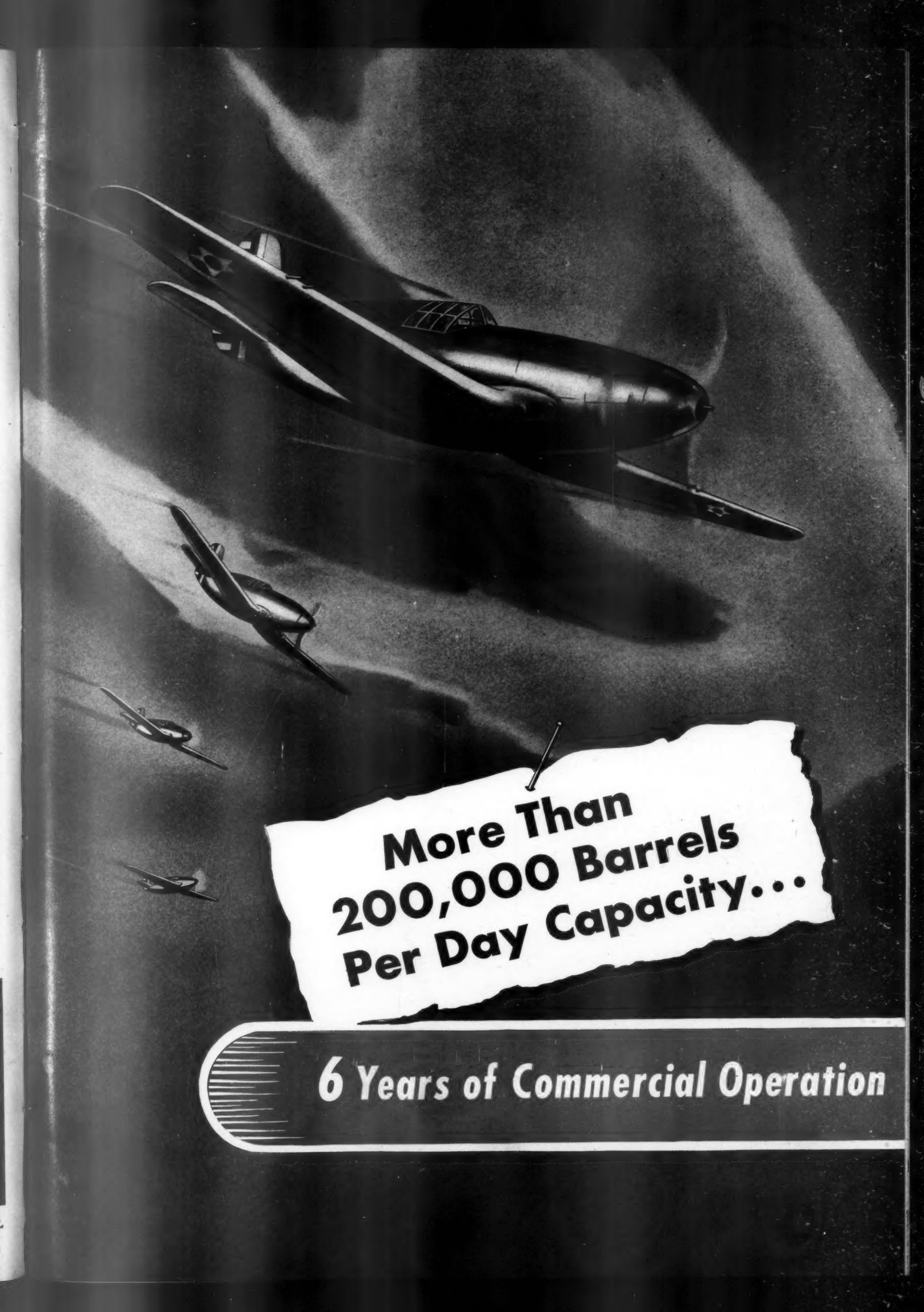
TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

HELP ASSURE VICTORY

Buy War Bonds. Conserve Rubber. Eliminate Unnecessary Travel. Use the Telephone Only When Important. Salvage All Scrap and Waste Material.

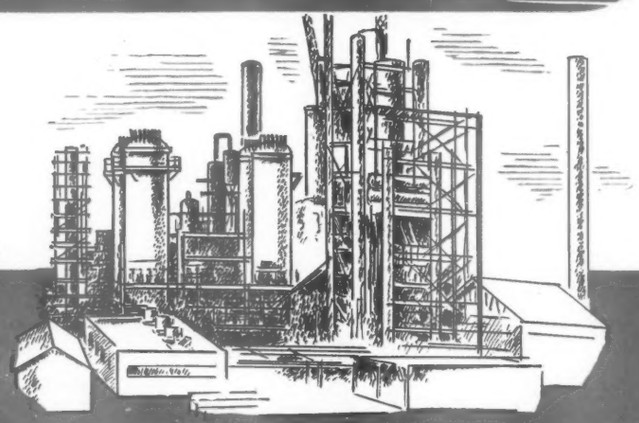
All Timken Bearing production now goes into fighting machines. However, the Timken Bearings in your motor vehicles or industrial machines will see you through the emergency—and beyond it—if you make sure they are lubricated and inspected regularly.




More Than
200,000 Barrels
Per Day Capacity...
6 Years of Commercial Operation

HOUDRY CATALYTIC CRACKING PROCESS

—commercially proved catalytic cracking process producing most of America's 100 octane aviation catalytic cracked base stock.



Commercially proved in 1936, Houdry was the first—and for six years the only process producing aviation base stock by catalytic cracking.

Among Houdry features are: high yield of high quality base stock; isobutane and isopentane production with low gas and coke; also low alkylate blending requirements.

The sixteen Houdry Catalytic Process units in operation in this country have a charging rate of more than 200,000 barrels per day. Houdry units under construction will soon increase this capacity to 300,000 barrels per day.

Thermofor Catalytic Cracking Process

Latest development available under Houdry license is Thermofor Catalytic Cracking which offers—

—the additional advantages of continuous, counter-current cracking

—a saving of 50% in strategic materials and a comparable saving in investment (over a complete plant) by the conversion of existing cracking facilities.

The addition of reactor, thermofor kiln, catalyst elevators and facilities — will convert any existing thermal cracking or topping unit to a Thermofor Catalytic Cracking Plant.

THE LUMMUS COMPANY · 420 LEXINGTON AVENUE, NEW YORK, N. Y.

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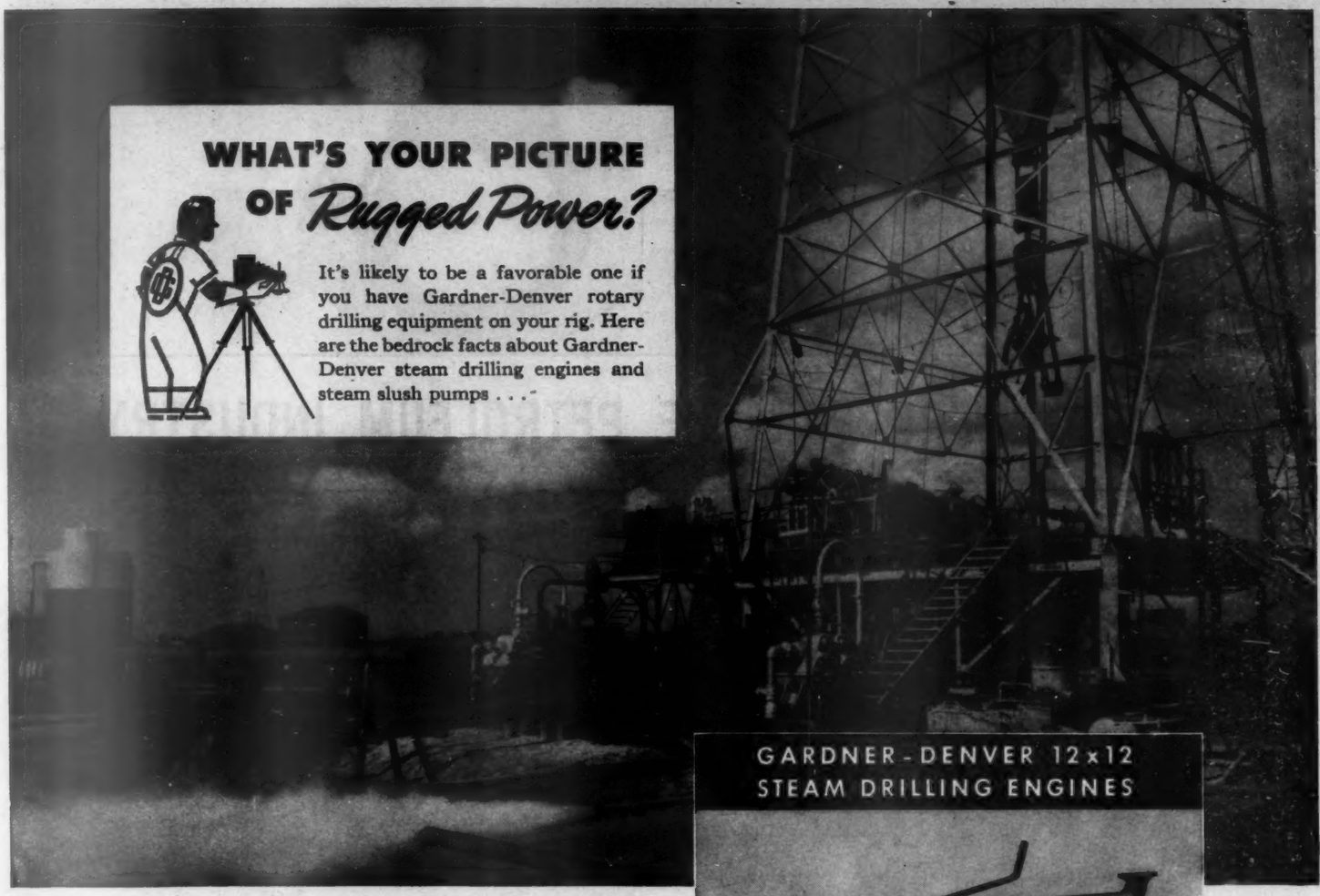
FLORIDA 671, BUENOS AIRES, ARGENTINA

LUMMUS

PETROLEUM REFINING PLANTS



WHAT'S YOUR PICTURE OF *Rugged Power?*

It's likely to be a favorable one if you have Gardner-Denver rotary drilling equipment on your rig. Here are the bedrock facts about Gardner-Denver steam drilling engines and steam slush pumps . . .

GARDNER-DENVER 12 x 12 STEAM DRILLING ENGINES

1. **RUGGED AND SAFE**—Rugged strength makes them suitable for use on the deepest wells, and with the highest steam pressures. The extra factor of safety in design eliminates breakages—minimizes wear—prevents shut-downs and keeps maintenance costs negligible.

2. **SMOOTH RUNNING**—Balanced steam valve construction, together with cranks set at 90°, assures easy starting, quick acceleration from rest, and quick reversal with the minimum of shock.

3. **PROTECTED CONSTRUCTION**—One-piece main frame completely encloses all moving parts—keeps out dirt, water and other foreign matter. Light weight, removable covers permit quick and easy access to all moving parts.

4. **AUTOMATIC LUBRICATION**—A positive, automatic splash system supplies lubricant to all moving parts, regardless of engine speed. Steam cylinders and valves are lubricated by a force-feed mechanical lubricator.

GARDNER-DENVER 18 x 8 x 20 STEAM SLUSH PUMP

1. **RATING**—Steam cylinders designed for 400 pounds maximum pressure—8-inch maximum diameter fluid pistons—fluid cylinders hydrostatically tested to 6000 pounds test pressure.

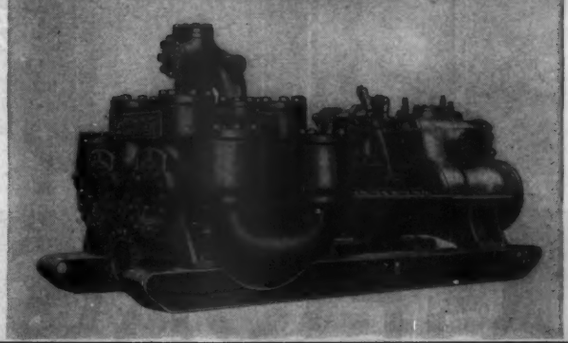
2. **SMOOTH RUNNING**—Improved Gardner-Denver divided fluid end—large, smooth suction manifold—streamlined with long radius, large area fluid passages into the valve pots, assuring less fluid friction, quicker filling and making higher lifts possible.

3. **QUIET OPERATION**—New enclosed roller bearing steam valve gear with telescopic levers is practically noiseless.

4. **LONG-LIVED**—Gardner-Denver "SLUSH-PROOF" rods, liners and pistons—field proved Gardner-Denver "SLUSH-PROOF" Duo-Seat, Top and Bottom Guided type valves—fluid cylinders of "GarDurloy," a special alloy iron of high tensile strength—extremely resistant to pressure and the abrasive action of slush.

GARDNER-DENVER 12x12 STEAM DRILLING ENGINES

GARDNER-DENVER 18x8x20 STEAM SLUSH PUMP

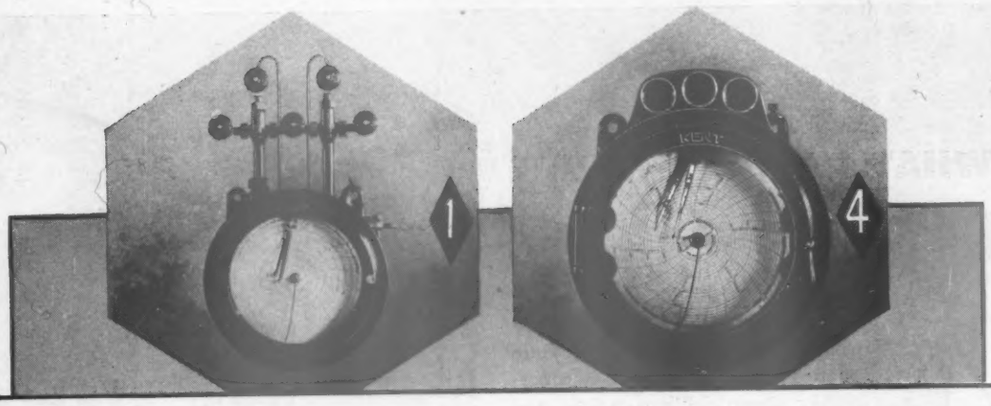


GARDNER-DENVER PRODUCTS SPEED VICTORY

For complete specifications, write Gardner-Denver Company, Quincy, Illinois

Dallas • Houston • Tulsa • St. Louis • Los Angeles • San Francisco • New York • Chicago • Pittsburgh • Continental Supply Co., Continental Building, Dallas, Texas • Republic Supply Company (of California), 2122 East 7th Street, Los Angeles, California

GARDNER-DENVER *Since 1859*



CONTROLLERS FOR THE PETROLEUM INDUSTRY

1 *K.M. Orifice Meter for recording all flows.*

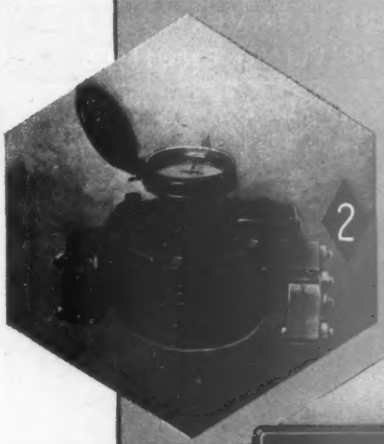
2 *Rotary Piston Meters for Oil and Petrol. Sizes ½" to 3".*

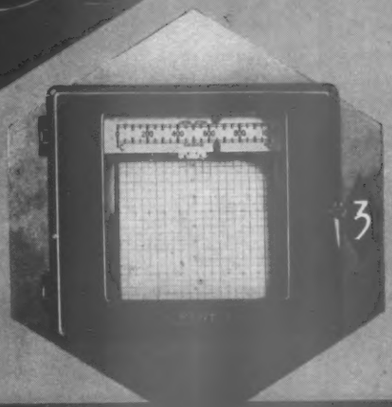
3 *Multelec Potentiometers —recording and controlling.*

4 *Air operated recording controllers for temperature, pressure, flow, level and ratio.*

5 *Diaphragm control valves. sizes ½" to 8".*

6 *Pilot operated pressure control valves. ½" to 8".*





GEORGE KENT

GEORGE KENT, LTD., LUTON, BEDFORDSHIRE. LONDON OFFICE: 200 HIGH HOLBORN, W.C.I. AGENTS: MELBOURNE: GEORGE KENT (VICTORIA), PTY. LTD., 395, COLLINS STREET. PORT-OF-SPAIN, TRINIDAD: DAVIDSON-ARNOTT & CO., UNION CLUB BUILDINGS. BUENOS AIRES, ARGENTINE: EVANS, THORNTON & CO., 465, CALLE DE FENSA.

WANT LOWER COST PER FOOT OF HOLE?

You're looking at it!

● Tough to translate this picture into terms of dollars saved in drilling? Then take another look, mister . . . Notice how easily Baldwin chains flex over the sprockets, how smoothly they run—and how quietly.

The explanation for Baldwin chains' cost-cutting qualities is not hard to find . . . it lies in their design, material and construction.

And don't be content with just looking at Baldwin chains—use them! Experienced drillers, men who know the problems of tough going in deep fields, use Baldwin chains. We'll rest our case with them.

For Sale in All Oil Fields

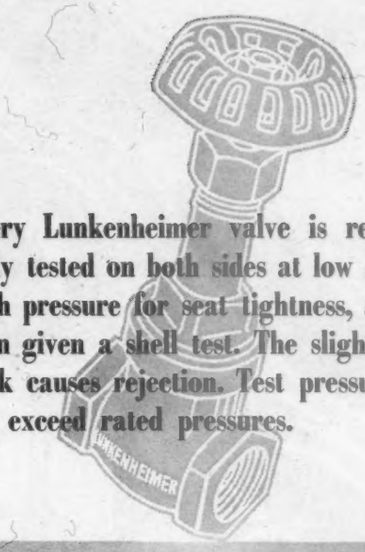
BALDWIN-DUCKWORTH

Division of Chain Belt Company

340 Plainfield Street, Springfield, Mass.

Factories at Springfield and Worcester, Mass.

BALDWIN CHAINS TRANSMIT ALL THE POWER



Every Lunkenheimer valve is regularly tested on both sides at low and high pressure for seat tightness, and then given a shell test. The slightest leak causes rejection. Test pressures far exceed rated pressures.

But

The Final Test of a Valve . . . is Performance

How does it hold up in service? Does it stand the gaff of hard usage? Is it dependable? Is it economical to use? How does it stack up in lasting qualities? The answers to these questions are the final and only convincing test of a valve. Ask any production man.

Now, when performance is more important than ever, when unnecessary time out for repairs is waste, and new valves aren't so easy to replace, valve users are profiting from their foresight in buying Lunkenheimer.

Rigid testing procedure is but one of the many precise steps in manufacture by which Lunkenheimer has maintained valve quality through the years. These steps are your assurance that Lunkenheimer Valves will give you more in uninterrupted performance for today's non-stop production schedules.

Since virtually all materials used in the manufacture of valves are on the list of critical materials, valve users are urged to furnish the highest possible preference ratings and proper "end use" information on their orders. This will be of mutual helpfulness.

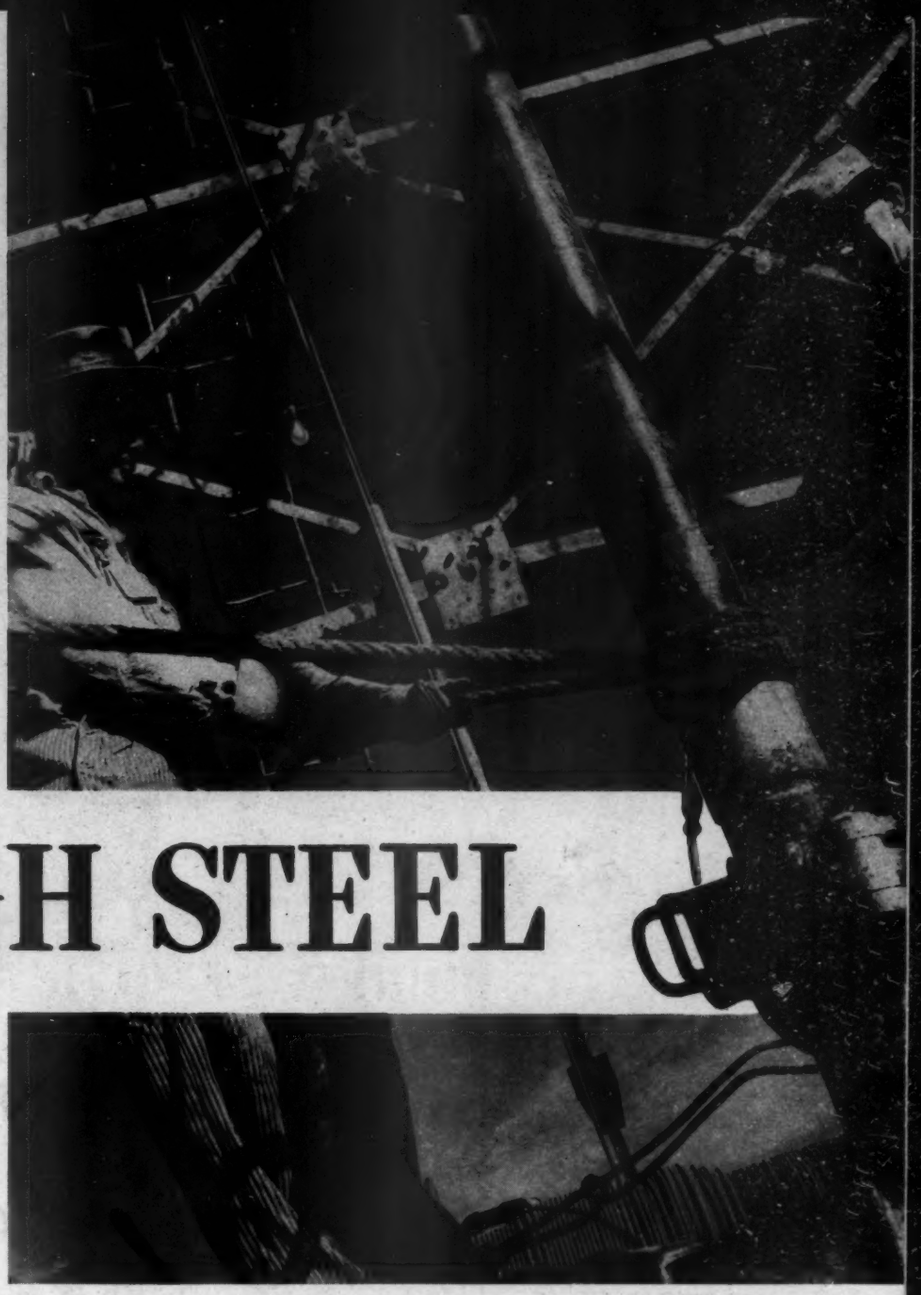
ESTABLISHED 1862
THE LUNKENHEIMER CO.
"QUALITY"
CINCINNATI, OHIO, U. S. A.
NEW YORK CHICAGO
BOSTON PHILADELPHIA
EXPORT DEPT. 318-322 HUDSON ST., NEW YORK

LUNKENHEIMER VALVES

Unleashing new

Fighting Power

THROUGH STEEL



Deep down in our earth there's plenty of stored up power for our armed forces. There's Oil—the energizing fluid for our warships, airplanes, tanks, scout cars—and there's Gas—the fuel for arms production. And Steel will help bring them into action.

It's up to steel casing and tubing to go down into the underground fields of oil and gas and convey these vital war fuels to the surface. And from there on into war service, Steel is needed all the way. So, Steel must be there, wherever it is needed.

That's our job—and Republic is seeing that it is done. We started breaking tonnage records long ago—have kept output going higher and higher—and it is still mounting. We're in the midst of our greatest expansion since we pioneered in the fabrication of electric weld casing, tubing and line pipe years ago. More new furnaces and mills are on the way.

It's all a part of Republic's vast war effort to supply the Oil and Gas Industries with the Steel needed to produce the war fuels for Victory.

REPUBLIC STEEL CORPORATION

General Offices: Cleveland, Ohio

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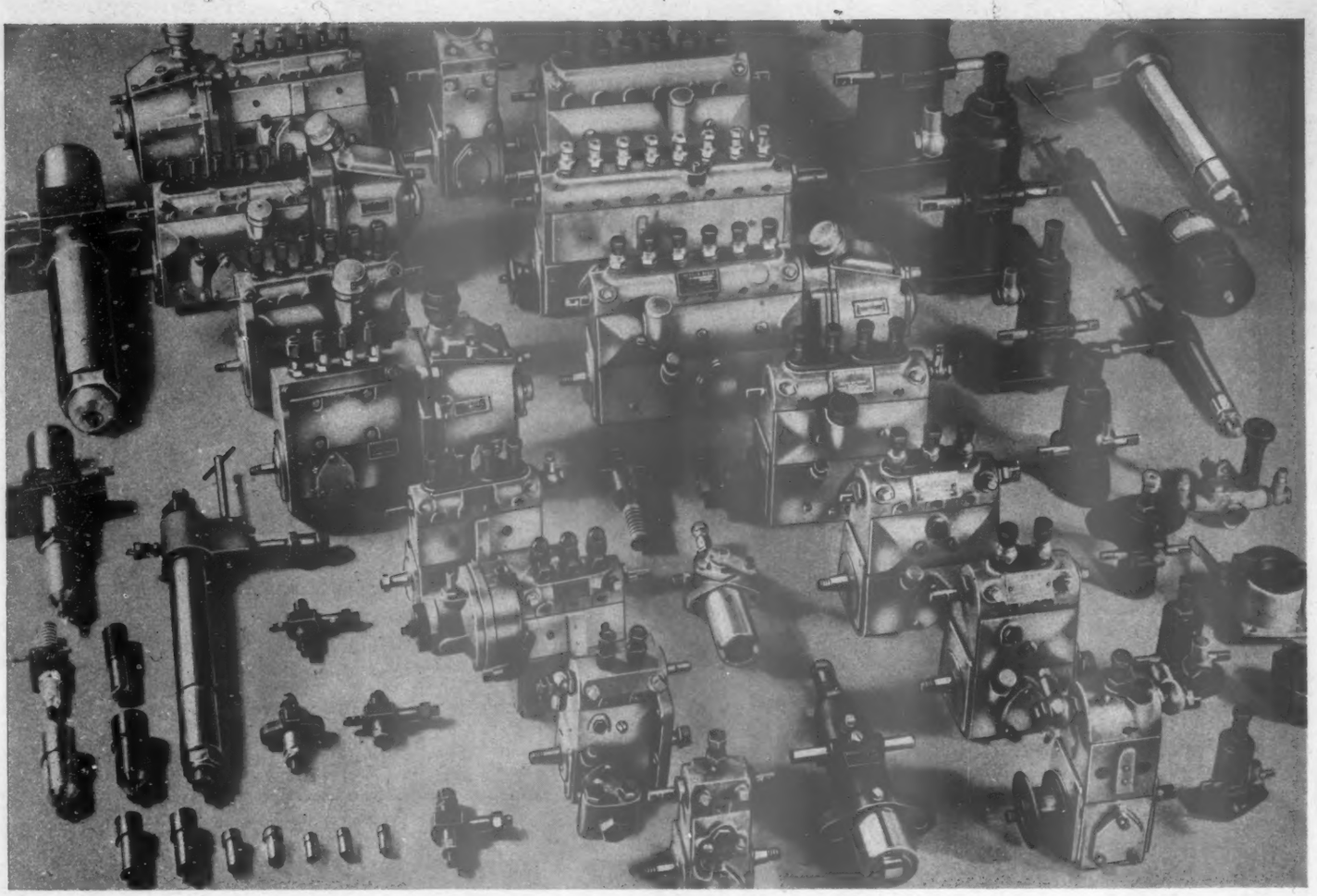
Los Angeles, California Houston, Texas
Berger Manufacturing Division • Culvert Division
Niles Steel Products Division • Steel and Tubes Division
Union Drawn Steel Division • Truscon Steel Company
Export Department: Chrysler Building, New York, New York

Find out what the pioneers of electric weld casing, tubing and line pipe have to offer you. Learn the advantages produced by the exclusive Republic fabricating processes. Ask for your free copy of "The Pipe of Progress"—an informative 44-page book of facts.

REPUBLIC *Electric Weld*

LINE PIPE...NORMALIZED CASING AND TUBING

Other products include Upson Bolts, Studs, Nuts and Rivets—Electrunite Heat Exchanger Tubes—Berger Shelving and Lockers.



Here *Wide* Variety *Helps Speed Production*

TO SPEED production common practice calls for specializing on a few standard models . . . whether it be the building of bombers or baby carriages.

But mechanized global warfare voids this rule for application to Diesel engines. Vast variety in job, climate and working conditions often calls for new and different Diesels for peculiarly special power assignments.

One of the most important variables in these Diesels is the fuel injection equipment.

Here's where wide variety helps speed production. Here's where American Bosch steps in and shoulders a big share of the engine designer's burden. For the total time to get a new Diesel into production can be drastically cut by the fact that the American Bosch line of fuel injection equipment comprises such a wide variety of types and sizes. This part of engine design becomes a relatively simple matter of proper selection . . . easily done with the help of the unequalled store of injection "know-how" at American Bosch.

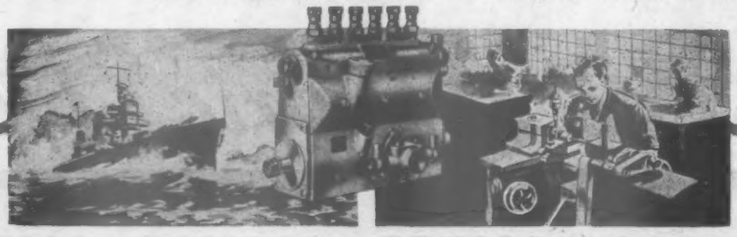
There is seldom need to design a new model of fuel injection equipment . . . seldom need for wasteful experimentation and worry.

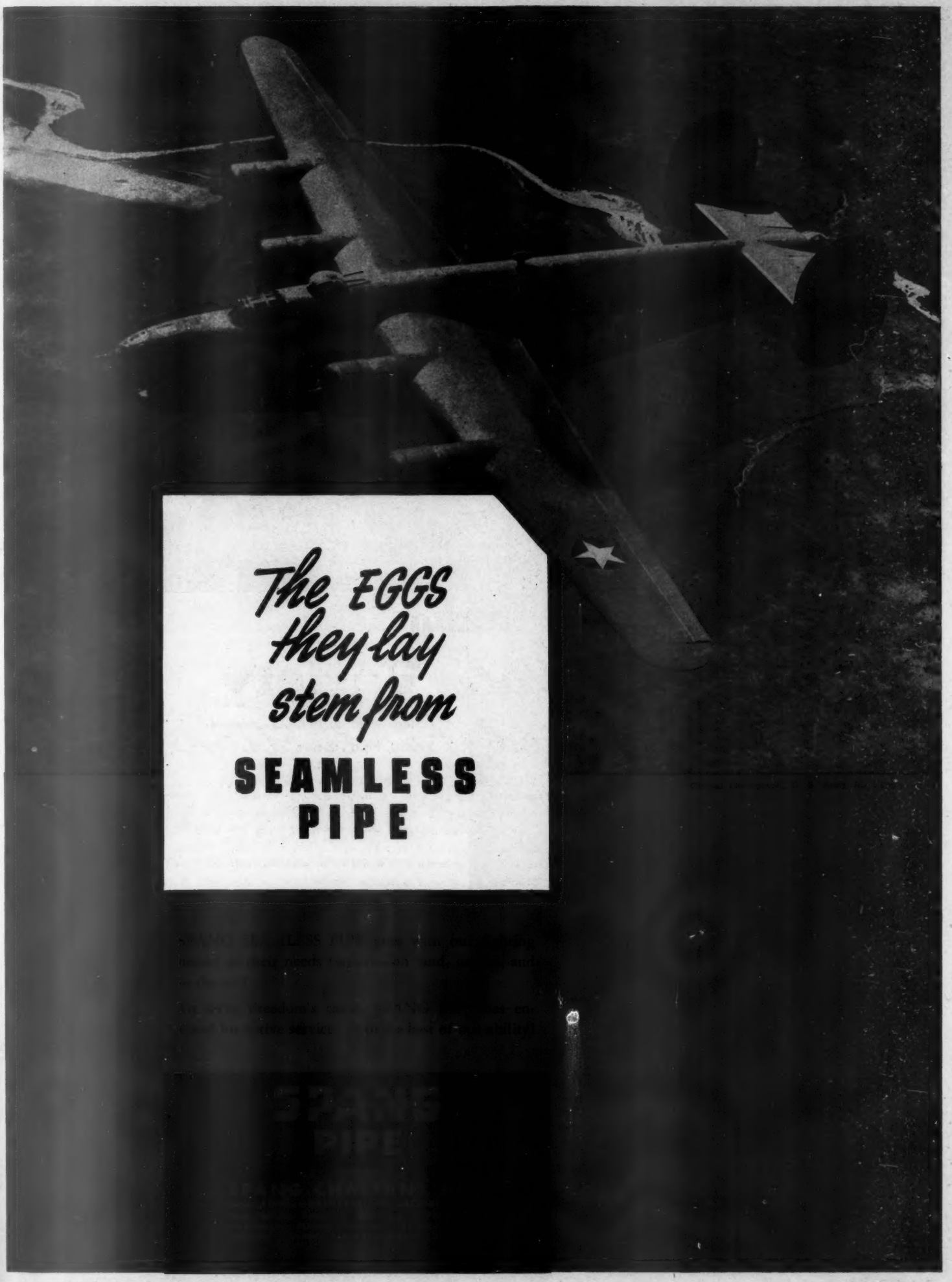
So precision-produced American Bosch equipment saves Diesel designing time . . . delivers performance that's helping to bring victory sooner.

Craftsmen in the New England Tradition

AMERICAN BOSCH

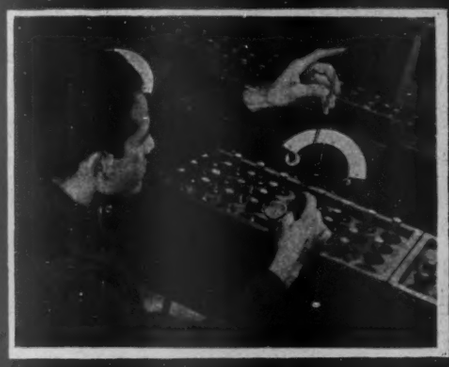
AVIATION & AUTOMOTIVE ELECTRICAL PRODUCTS . . . FUEL INJECTION EQUIPMENT




The EGGS they lay stem from
SEAMLESS PIPE

IF IT'S PIPING
CONTACT FLORI
OUR scope: Fabricated Piping...for steam, water, air, oil, gas, chemicals
Random mill or cut lengths, bent, coiled, welded, flanged, threaded. Valves, Pipe Fittings.
In brief: anything in tubular or plate steel fabrication.
Our customers: United States of America and Allied Nations.
Send us your inquiries.
FLORI
PIPING
THE FLORI PIPE COMPANY • ST. LOUIS, MO.

M ...his Tretolite library of ...unds your reference in treating oil emulsions



Years of experience in emulsion treatment have resulted in the accumulation of many treating compounds in Tret-O-lite's Research Department. This "library" of proven compounds is always on tap when difficult treating problems are encountered. In it are compounds especially developed for treating all types of emulsions ... for handling your dehydrating problems efficiently.

Through your Tret-O-lite representative, Tret-O-lite Research is always on hand ... ready to help you ... with your own particular problem.

TRETOLITE COMPANY

Manufacturing Chemists

WEBSTER GROVES, ST. LOUIS COUNTY, MO.

LOS ANGELES, CALIFORNIA

Oil is Ammunition Treat it Right!

Complete Service for Every Field

Tret-O-lite

REG. U.S. PAT. OFF.

DEHYDRATING DESALTING

Top Speed for "Coming out"

With a Twin Disc Hydraulic Torque Converter, you can "come out of the hole FAST" . . . save valuable time. No need to nurse your engine along while it picks up speed . . . not even a sudden, shock load can stall it because the converter cushions the shock . . . automatically adjusts speed to load.

Equipped with a torque converter, your gas or diesel engine will work at its best . . . give you "full head of steam" performance at all times . . . because the torque converter provides high torque at low output shaft speeds.

Both the Twin Disc Hydraulic Torque Converter and the Twin Disc Hydraulic Coupling will dampen out the engine's cyclic variations . . . increase the life of your transmission . . . but *only* the Hydraulic Torque Converter will give you the added advantage of torque multiplication.

Inquiries from rig builders with revolutionary ideas about "Draw-works of the Future" will be welcomed by the Engineering Department, Hydraulic Division, Twin Disc Clutch Company, Rockford, Illinois.

Left: Twin Disc Hydraulic Torque Converter (Lysholm-Smith type). In considering installation, ask for complete data and specific recommendations.

Right: Twin Disc Hydraulic Power Take-off for application to internal combustion engines with standard S.A.E. flywheel housing dimension. Sizes: 14" to 24". In considering installation, ask for complete data and specific recommendations.

TWIN DISC
CLUTCHES AND HYDRAULIC DRIVES
REG. U.S. PAT. OFF.

TWIN DISC CLUTCH COMPANY • RACINE, WISCONSIN

A Switch in Time Saves— COPPER and TIN

By switching to POWELL Iron Body Valves wherever they will serve as effectively as bronze, you will help conserve these critical metals.

Before the war made copper and tin virtually "precious metals," many buyers and users of valves automatically thought in terms of bronze. Apparently the impression existed that the desired service could be obtained only by using valves made of this alloy.

But now the necessity for conserving the more critical non-ferrous metals has brought the realization that iron body valves—especially Iron Valves by POWELL—will in many installations serve just as effectively as bronze.

So when you specify POWELL Iron Valves you not only render a patriotic service but, because of the lower priority rating required, you can expect earlier delivery and—YOU'LL HAVE SAVINGS TO INVEST IN WAR BONDS.

Fig. 1793—Iron Body Bronze Mounted "Model Star" Gate Valve, with flanged ends, outside screw rising stem, bolted flanged yoke, bronze renewable seat rings and taper wedge solid disc. Sizes 2" to 30". Available with taper wedge double disc (Fig. 1444) in sizes 2" to 12". Also made in All Iron—Fig. 1453 with double disc; Fig. 1816 with solid disc.

Fig. 1460—Iron Body Bronze Mounted "Master Pilot" Gate Valve, with screwed ends, rising stem, bolted bonnet and taper wedge solid disc. Made in sizes ¼" to 2" for 150 pounds W.S.P.; 2½" to 4" for 125 pounds W.S.P. Also made in All Iron—Fig. 1462.

The Wm. Powell Co.

Dependable Valves since 1846

Cincinnati, Ohio

POWELL VALVES

THE pressure of war production has made the technique of precision control a topic of extreme interest to engineers, operators and executives.

The increasingly serious shortage of skilled labor, the necessity for increased throughputs, and the more exacting standards often found in government specifications present a three-fold problem to industry.

As a result plant operators are turning more and more to Automatic Precision Control Instruments to eliminate errors, to reduce the burden of supervision, and to free skilled labor for more urgent duties. At the same time, Automatic Control Instruments have, in many instances, permitted speeding up rates of production where hand control would be impossible.

Because there is ample proof that Automatic Control Instruments, properly selected and installed, provide the answer to industry's three-fold problem, the Brown Instrument Company has prepared a 64-page booklet on the subject "The Technique of Precision Control in Industrial Processes." Engineers who have read this new booklet acclaim it as an important and timely contribution to the war effort—a complete document of modern Precision Control Instrumentation.

The purpose of this book is to help operators and management toward an understanding of the basic principles of automatic control, and to acquaint them with the manifold applications of automatic Indicating, Recording, Controlling, and Signalling systems for measuring and controlling temperatures, pressures, flows, and liquid levels in industrial processes.

Contents of this booklet include an analysis of different types of automatic instrument control systems and specific examples of typical control applications in the process, chemical, steel, petroleum, ceramic, food, air conditioning and textile industries. Examples are carefully selected to show methods directly applicable to many other industries, thus covering the entire scope of automatic precision control in industry.

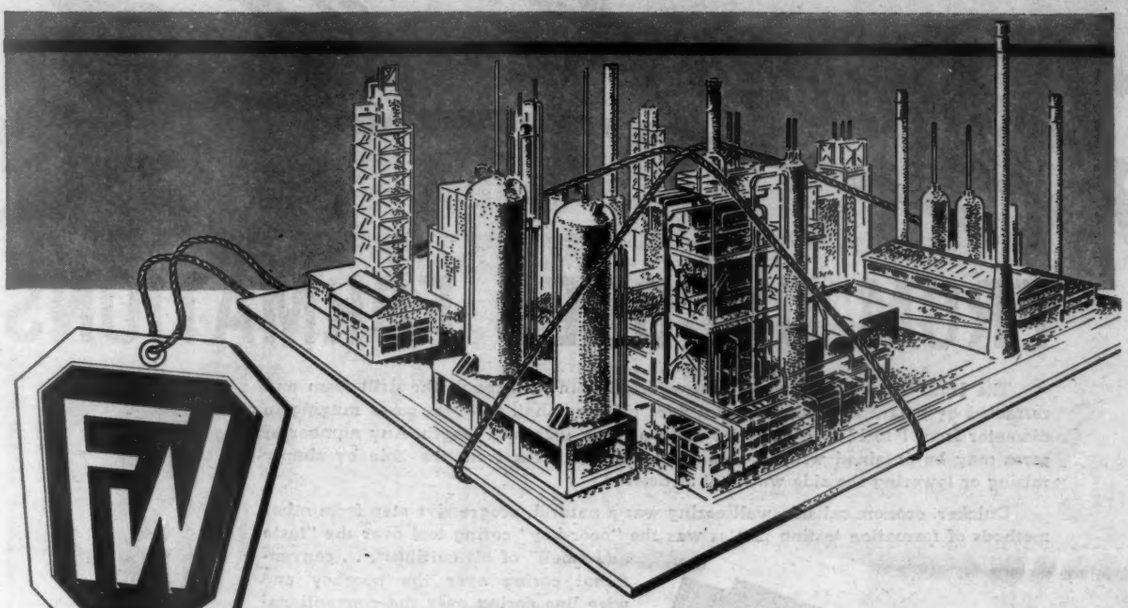
For a free copy of the booklet 80-1 "The Technique of Precision Control in Industrial Processes" write to the Brown Instrument Company on your company letterhead.

For Temperatures . . . . . Pressures . . . . . Flows . . . . . Liquid Levels

BROWN INSTRUMENTS

ELECTRIC • AIR OPERATED

THE BROWN INSTRUMENT COMPANY, 4488 WAYNE AVENUE, PHILADELPHIA, PENNSYLVANIA
DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR CO.
MINNEAPOLIS, MINNESOTA, AND 119 PETER STREET, TORONTO, CANADA
Wadsworth Road, Perivale, Middlesex, England — Nybrokajen 7, Stockholm, Sweden



Experience . . .

. . . . . THIRTY-EIGHT YEARS OF PETROLEUM REFINERY AND CHEMICAL PLANT ENGINEERING SERVES THE NEW PETRO-CHEMICAL INDUSTRY

In 1904 Foster Wheeler engineered its first petroleum refinery project. It has played its part in the growth of this industry from a lusty infant to a peace and wartime colossus.

Now the war has accelerated petroleum research into a new field—that of petroleum chemistry. Foster Wheeler, as in the past, is sharing in the development of this new industry; engineering, designing, fabricating, and building complete plants for producing such war chemicals as:

- . . .SYNTHETIC RUBBER COMPONENTS
- . . .TOLUENE
- . . .BENZENE DERIVATIVES
- . . .ETHYLENE
- . . .100 PLUS AVIATION GASOLINE AND COMPONENTS
- . . .SOLVENT AVIATION LUBRICATING OIL REFINING
- . . .ALCOHOLS

FOSTER WHEELER CORPORATION
165 BROADWAY, NEW YORK, N. Y.

FOSTER WHEELER

Recovers Real Cores

FROM UNCORED FORMATIONS

The Hunt Side Wall Coring Tool, which is run in through the drill stem and retracted by means of a conventional wire line overshot, recovers cores ranging in diameter from 1 to 1¾" in diameter and up to six inches in length. Any number of cores may be obtained without removing the drill stem from the hole by simply raising or lowering the side wall tool as desired.

Quicker, economical side wall coring was a natural, progressive step from other methods of formation testing just as was the "poor-boy" coring tool over the "taste and smell" of bit cuttings . . . conventional coring over the poorboy and wire line coring over the conventional design. It was natural, too, that HUNT . . . a leader in conventional wire line coring . . . should develop this faster, more economical coring technique.

Core tube in side wall after lowering of drill pipe has caused penetration. Drill pipe is now slightly raised, and core recovered by wire line.

Core tube deflected, with wire line retractable barrel in position ready to penetrate side wall to take core.

A BUSINESS BUILT ON SERVICE

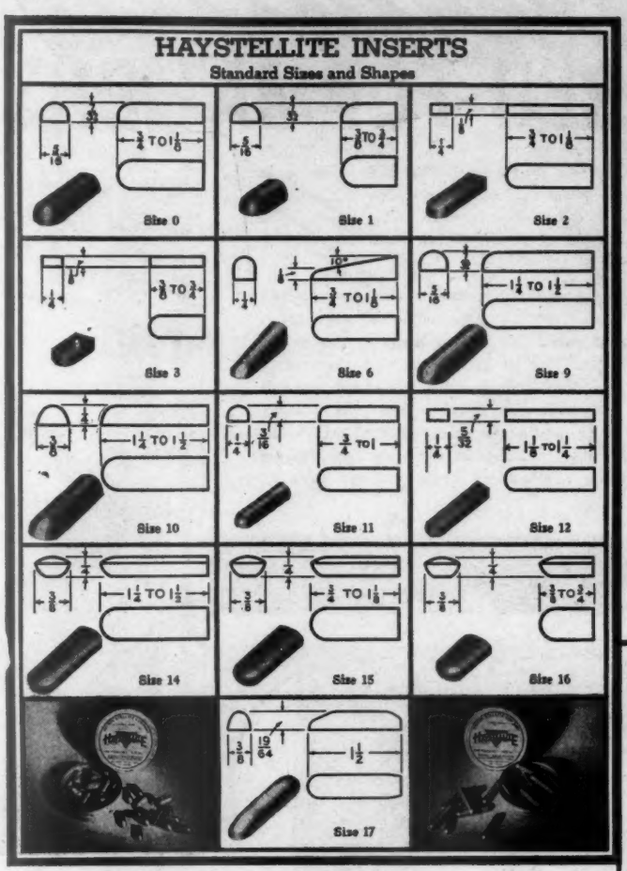
HUNT TOOL COMPANY

FIELD SHOPS:
Houston, Bay City, Corpus Christi, Jennings, Shreveport, Harvey

EXPORT SALES:
W-K-M Company, Inc.
74 Trinity Place, New York City

HUNT TOOL COMPANY
HOUSTON, TEXAS, U. S. A.

To produce most efficient drilling tools—
use Haystellite Inserts and Tube Rod

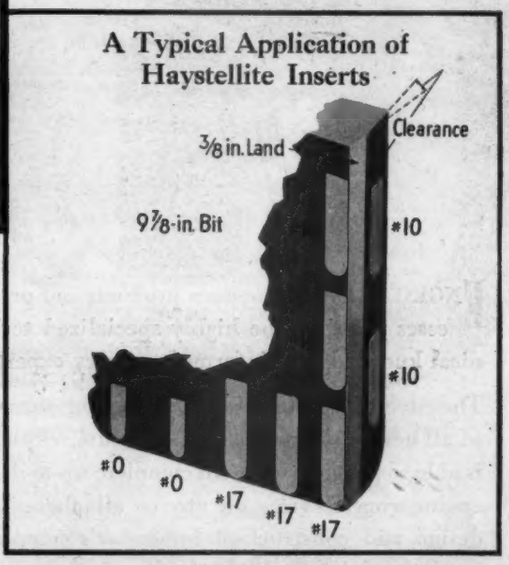


GOOD bits, correctly set with Haystellite inserts and faced with Haystellite tube rod, can be depended upon to make more footage of straight, out-to-gauge hole per round trip.

Haystellite cast tungsten carbide inserts are *hard* enough to withstand severe abrasion, and *tough* enough to withstand shocks. And to assure uniform performance, every Haystellite insert is rigidly inspected before it leaves the factory.

There is a sizé and style of Haystellite insert for every type of bit, as shown at the left. And Haystellite tube rods are available in 5 tube diameters and 8 different standard screen sizes of tungsten carbide particles.

For the most outstanding drilling performance and the lowest drilling costs, standardize on Haystellite inserts and tube rod for hard-setting and hard-facing all of your drilling tools!



Haynes Stellite Company ***can help you.*** The slight extra care required to make each drilling tool the *best* it can be made is more than repaid by more dependable performance and lowered drilling costs. We have the experience and the organization to help you use Haystellite products to obtain best results at lowest cost. Call on us, without obligation.

HAYSTELLITE TRADE MARK
Cast Tungsten Carbide Diamond Substitute

HAYNES STELLITE COMPANY
Unit of Union Carbide and Carbon Corporation
General Office and Works: Kokomo, Indiana
UCC
Foreign Sales Department: New York, N. Y.

The words "Haystellite" and "Haynes Stellite" are registered trade-marks of Haynes Stellite Company.

ENGINEERING for modern products and processes requires the highly specialized technical knowledge of informed refinery experts.

The McKee organization, by keeping abreast of all new developments in petroleum refining, is able to provide you with complete up-to-date engineering services on any or all phases of design and construction for today's complex products and processes.

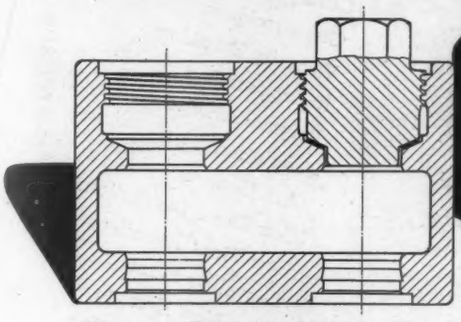
Products and Processes for which McKee engineering and construction services are available:

TOLUENE • PETROLEUM SYNTHETICS
BUTADIENE • CATALYTIC CRACKING
ALKYLATION • GAS CONCENTRATION
ISOMERIZATION • HYDROGENATION
DEHYDROGENATION

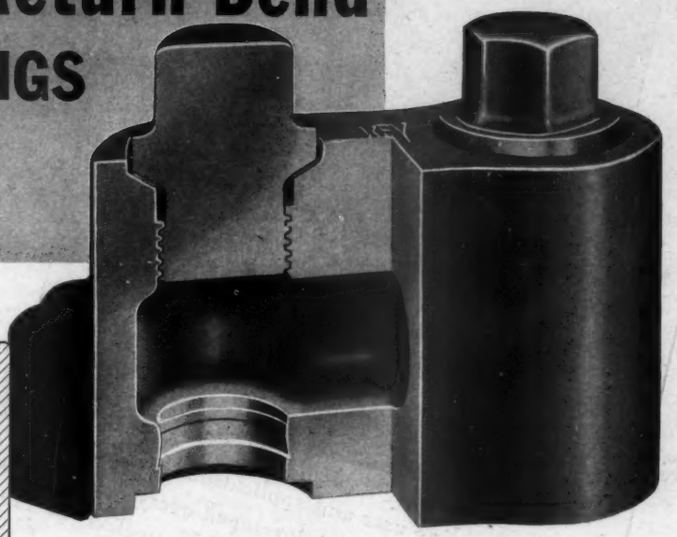
Arthur G. McKee & Company
★ *Engineers and Contractors* ★
2300 CHESTER AVENUE • CLEVELAND, OHIO

KEY Announces

2 New Return Bend FITTINGS



Type 1700 GB (Gasket at Bottom) for corrosive vapors and liquids.



Type 1700 GT (Gasket at Top) for steam and other non-corrosive vapors and liquids.

Type 1700 GT—has the gasket at the top of the plug and is designed for NON-corrosive use—steam and other vapors—and NON-corroding liquids—This construction advantage permits an absolute minimum of center-to-center measurement.

In connection with its use on steam it has been fully approved by Hartford Steam Boiler Inspection Service.

☆

Type 1700 GB—is designed with the gasket at the BOTTOM of the plug where it protects the threaded section from corrosive action of vapors or liquids. This construction requires wider center-to-center measurement than the Type 1700 GT but it has the advantage of being applicable where corrosion is a factor.

Save Critical Materials Because They Do Not Require Alloy Bolting Stock . . . Simple In Design . . . Fewer Parts . . . Stronger . . . Not A Substitute But A Definite Improvement . . . Meet Many Specific Problems

Here's the answer to hundreds of problems of the industry where Return Bend Fittings are needed. Key Gasket Type Return Bends have been proved and are now in production . . . they are ideal for many installations in the Petro-Chemical as well as the Petroleum Industry.

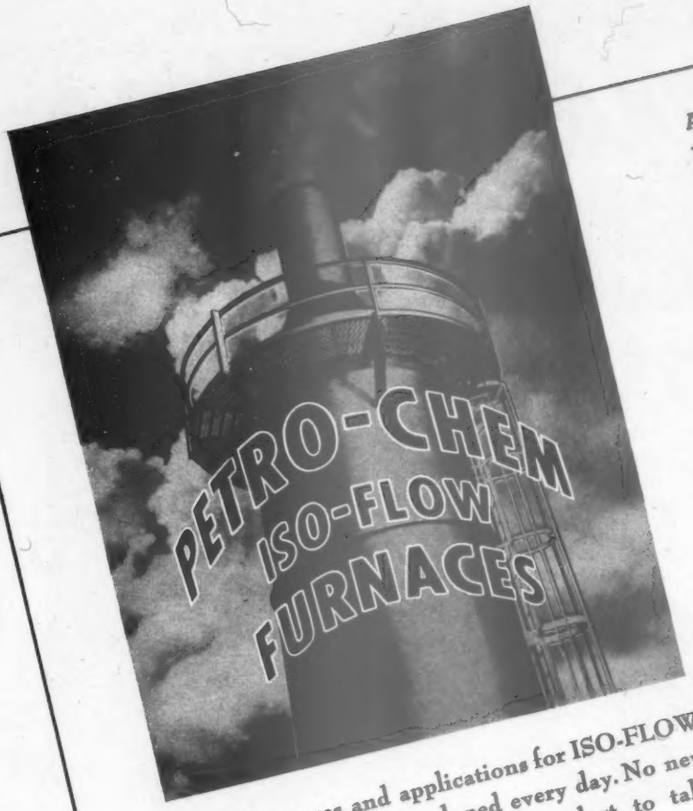
Study the many advantages noted above—in addition, note that the sealing factor is *not* dependent on the threads—the gasket makes the seal—That means less wrench pressure in make-up—freer fittings at down time.

Let us give you *all* of the details. Write—Wire or Phone Key Company, East St. Louis, Illinois, BRidge 2400 or consult your nearest Key Company District Office.

KEY Refinery Fittings for . . .
CATALYTIC CRACKING . . . HYDROGENATION . . .
POLYMERIZATION . . . ISOMERIZATION . . . REFORMING
. . . ALKYLATION . . . STYRENE . . . BUTADIENE . . . TOLUENE

KEY COMPANY
EAST ST. LOUIS, ILL.

CHICAGO · NEW YORK · PITTSBURGH · TULSA · HOUSTON · LOS ANGELES



Expanding uses and applications for ISO-FLOW* Furnaces are being developed every day. No new or established process should neglect to take into consideration the many advantages of the ISO-FLOW* Furnace design.

ISO-FLOW* Furnaces are in wide use throughout the Petroleum and Chemical Industries for all types of processing including the manufacture of Styrene and Butadiene for Synthetic Rubber, Ethylene, Toluene, Aviation Gasoline, Lube Oils.

To the right is a partial list of the services for which ISO-FLOW* Furnaces are now being operated or under construction.

More than 100 ISO-FLOW* Furnaces went into operation or under construction, so far this year for the services listed on the right. They can be of service to you.

- Atmospheric Distillation
- Vacuum Distillation
- Atmospheric Rerunning
- Vacuum Rerunning
- Filtrol Fractionation
- Clay Treating
- Solvent Treating
- Solvent Dewaxing
- Solvent Concentration
- Liquid Heating
- Asphalt Heating
- Thermal Reforming
- Thermal Cracking
- Catalytic Reforming
- Catalytic Cracking
- Gas Pyrolysis
- Viscosity Breaking
- Hydrogenation
- Polymerization
- Alkylation
- Gas Heating
- Gas Plant Distillation
- Gas Plant Reboilers
- Recycling Plants
- Pipe Line Heating
- Steam Superheating
- Auxiliary Fired Economizers

*Trade Mark. Patents issued and pending.

PETRO-CHEM DEVELOPMENT CO., INC., 120 EAST 41st STREET, NEW YORK, N. Y.

Representatives: Bethlehem Supply Co., Tulsa, Houston, Los Angeles Faville-Levally Corp., Chicago.

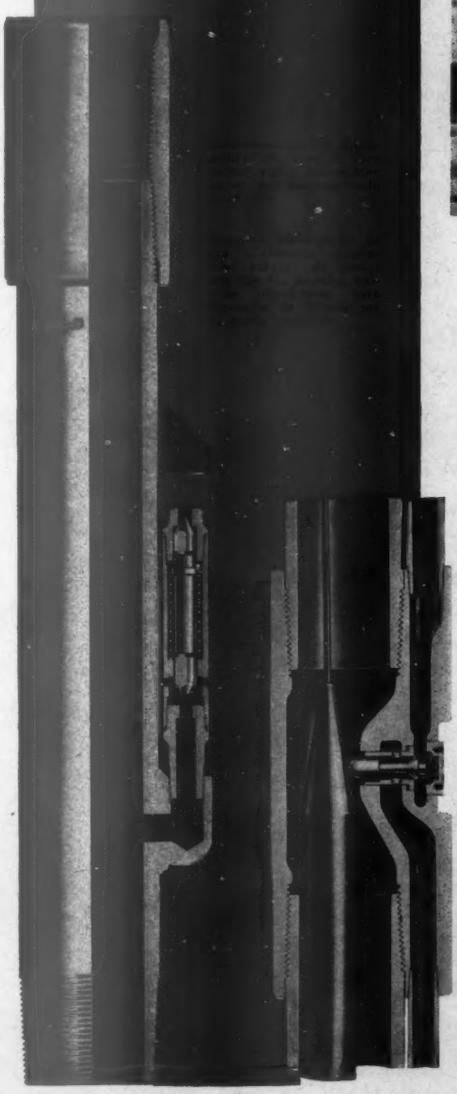
LOW-COST, EFFICIENT

FOR THE

Americas*

BETTER BE SAFE THAN SORRY

GUIBERSON



SURFACE EQUIPMENT FOR BOTTOM HOLE FLUID LIFT

* BAJO COSTO, PRODUCCION DE GRAN RENDIMIENTO PARA LAS AMERICAS

LESS MATERIALS AND MORE PRODUCTION WITH GUIBERSON GAS LIFT EQUIPMENT

Con Los Equipos Elevadores De Gas "Guiberson" Se Obtiene Mayor Produccion Con Menos Materiales

You get the last drop of oil with a minimum of material by using Guiberson gas lift equipment. Positive opening and closing action, dependable performance under all conditions, and greater economy in operation are our definite promises to you, based upon actual field performance of hundreds of installat ons. For detailed and comprehensive specifications of Guiberson gas lift equipment and the many other Guiberson tools see the Guiberson section, Composite Catalog, or write us direct.

Empleando los equipos elevadores de gas "Guiberson" se obtiene hasta la última gota de aceite con un mínimo de material. Acción efectiva de apertura y de cierre, funcionamiento seguro bajo todas las condiciones y mayor economía, ésta es nuestra promesa definida, la que le hacemos a usted basándonos en la práctica efectiva en centenares de instalaciones. Sírvase escribirnos directamente si desea tener detalles completos y especificaciones de los equipos elevadores de gas "Guiberson", así como de sus muchas otras herramientas, vea también la sección respectiva del catálogo mixto Guiberson.

GUIBERSON TYPE C FLOW VALVE—Operates solely by differential pressures. Positive in operation. Double-acting piston is the only moving part. Valve opens only when head of oil is heavy enough to establish the pre-determined differential—closes promptly after gas has lifted the head of oil.

VALVULA "GUIBERSON" DE DESCARGA TIPO C—Funciona únicamente por diferencia de presiones. De acción segura en el trabajo. Su única pieza movil es el imbolo de doble acción. La Valvula se abre únicamente cuando el avance del aceite ejerce suficiente empuje para establecer la diferencia de presión establecida de antemano—se cierra prontamente después de que el gas ha levantado la tapa del aceite.

GUIBERSON BOTTOM-HOLED FLUID LIFT—Designed to produce wells of either low fluid levels or low productivity. A complete gas-lift system for producing wells through the stripper stage. Will strip the last drop of oil from the well without other lifting equipment. Simple, efficient, and economical.

ELEVADOR DE FLUIDOS "GUIBERSON" DE FONDO PERFORADO—Diseñado para la producción de pozos tanto de nivel bajo de flúidos como de bajo rendimiento. Un sistema elevador de gas completo para pozos en producción hasta la etapa de raspado. Extraerá hasta la última gota de aceite que haya en el pozo sin ayuda de ningún otro equipo. Sencillo, eficiente y económico.

ENGINEERING SERVICE—Our highly skilled field engineers are available to producers for the analysis and solution of lifting problems. When the necessary well data are available, our engineers will make specific recommendations for the correct applications of our gas lift equipment.

Los servicios de nuestros personal de ingenieros de campo esté la disposición de los productores, para analizar y resolver sus problemas de extracción. Cuando se tienen los datos necesarios acerca del pozo, nuestros técnicos pueden hacer las recommendaciones convenientes para la aplicación de nuestros equipos elevadores.

MORE TOOLS OF THE FAMOUS GUIBERSON LINE

● PACKER

● TUBING CATCHER

● SWAB

● DRILLING HEAD

THE GUIBERSON CORP.

DALLAS, TEXAS, U. S. A.

Export Representative: I. Frank Brown, 30 Rockefeller Plaza, New York

Three sure things

In 1943 Uncle Sam will need huge quantities of 100-octane gasoline for our fighting flyers, toluene for explosives and synthetic rubber to keep military and essential civilian wheels rolling

We don't know just how much will be needed but these three things we *do* know

1. There is enough petroleum to supply the components of these vital products in enormous volume
2. U.O.P. processes are ready to produce them from that petroleum efficiently and speedily, and those processes are at the service of all refiners under license from Universal
3. U.O.P. know how, built up in a quarter century of experience, is exclusively devoted to helping the refining industry achieve the greatest possible war production—till victory is won

Happy New Year

OIL IS AMMUNITION—USE IT WISELY

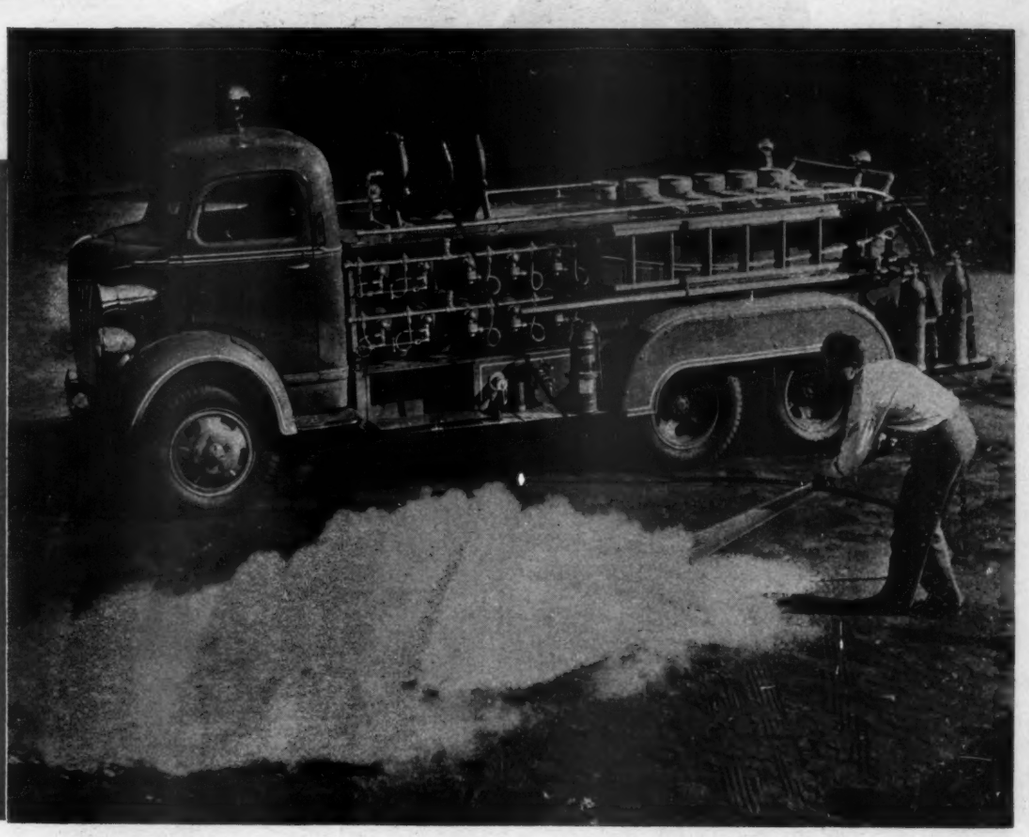
Universal Oil Products Co
Chicago, Illinois

Dubbs Cracking Process
Owner and Licensor

THE REFINERS INSTITUTE OF PETROLEUM TECHNOLOGY

THE TRUCK THAT *Gets there fast...*

...FOR PROTECTION AT VITAL AIRPORTS



WHEN airplanes fall, explosions occur or conflagrations break out in the highly inflammable material about an airport, or when incendiary bombs are dropped on buildings, quick action is required. Crash trucks must "get there fast." Neither mud, sleet or snow can be allowed to stop them.

The superior speed, maneuverability and ease of handling, inherent in standard Ford trucks, coupled with Marmon-Herrington *traction through all wheels*, provide the extra protection that is desired.

War is the laboratory which will make these vehicles better than ever, when they are available, again, to civilian users. Buy War Bonds. Help speed that day.

CUANDO se derriban los aviones, ocurren explosiones o se producen incendios de los materiales inflamables que por lo general hay en un aeropuerto; y cuando caen bombas incendiarias en los edificios también se producen incendios. En todos estos casos, se requiere acción rápida. Los camiones de auxilio deben llegar a tiempo a los puntos amenazados. Ni el barro, ni la nieve deben retardar su marcha.

La rapidez, la maniobrabilidad y la facilidad de manejo inherentes de los camiones Ford normales, añadidas a la *tracción por las cuatro ruedas* de la propulsión Marmon-Herrington, constituyen la adicional protección que se necesita.

La guerra es el laboratorio que hará mejores que nunca estos vehiculós, cuando de nuevos se ofrezcan a los interesados en tiempo de paz.

MARMON-HERRINGTON

All-Wheel-Drive

MARMON-HERRINGTON CO., Inc., Indianapolis, Indiana

WeldELLS

THEY SPEAK HIS LANGUAGE
—these precision quarter-marks

Just ask the man who welds them, if you question the importance of these precision quarter-marks that are found only on WeldELLS and other Taylor Forge Welding Fittings.

He'll tell you how much time and trouble these reference points save in figuring center lines, angles and offsets; how much easier they make it to keep piping lined up in the proper plane. Fact is, this exclusive feature would be reason enough to insist on WeldELLS even if they didn't have the many other improving features listed opposite.

But quarter-marks are only one extra value of the fittings that have *everything* . . . for the man who specifies, welds, or pays the bill!

TAYLOR FORGE & PIPE WORKS, General Offices & Works: Chicago, P. O. Box 485 New York Office: 50 Church Street • Philadelphia Office: Broad Street Station Bldg.

WeldELLS have *everything*—

No other fittings for pipe welding combine these features which in addition to quarter-markings include:

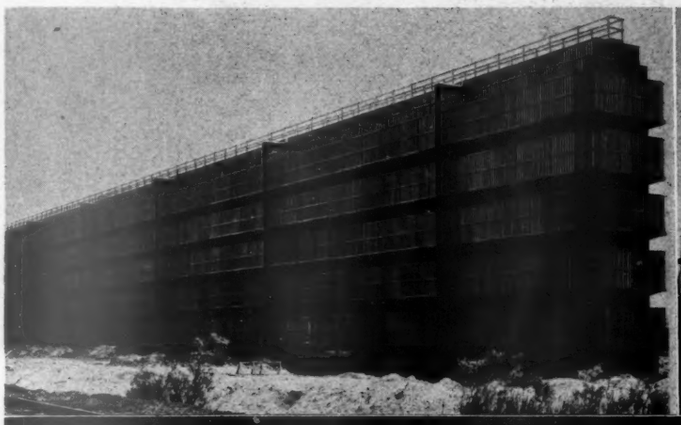
- **Seamless**—Greater strength and uniformity.
- **Tangents**—Keep weld away from zone of highest stress—simplify lining up.
- **Selective reinforcement**—provides uniform strength.
- **Permanent and complete identification marking**—saves time and eliminates errors in shop and field.
- **Wall thickness never less than specification minimum**—assures full strength and long life.
- **Machine tool beveled ends**—provide best welding surface and accurate bevel and land.
- **The most complete line of Welding Fittings and Forged Steel Flanges in the World**—insures complete service and undivided responsibility.

THE EFFICIENCY OF THE WHOLE [redacted] *IS DETERMINED BY ITS PARTS*

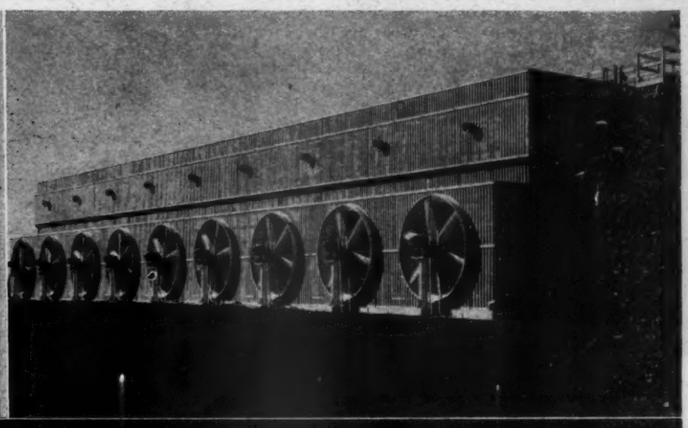
Check the Components of Your Plant

Modern auxiliary plant equipment can frequently be added to increase production and improve the finished product. ¶ ¶ ¶ For example, a Fluor Gas Cleaner will remove detrimental solids and liquids from a gas stream. ¶ ¶ ¶ The addition of Fluor Air Cooled Mufflers will make your compressor plant practically silent and reduce muffler maintenance costs to the minimum. ¶ ¶ ¶ A Fluor Induced or Forced Draft Cooling Tower can be installed to fit your available space and to operate for the longest time at the lowest cost. If space is not a limiting factor, a Fluor Atmospheric Aerator Type Cooling Tower with exclusive features will give you the most economical service. ¶ ¶ ¶ These modern and efficient products are fully described in Bulletins.

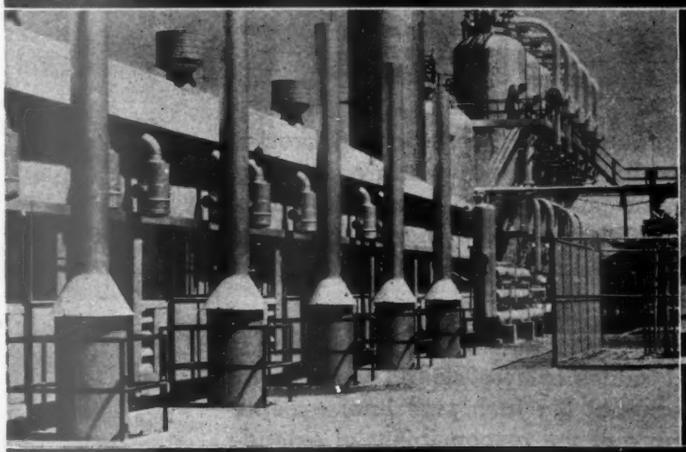
Be Sure With Fluor



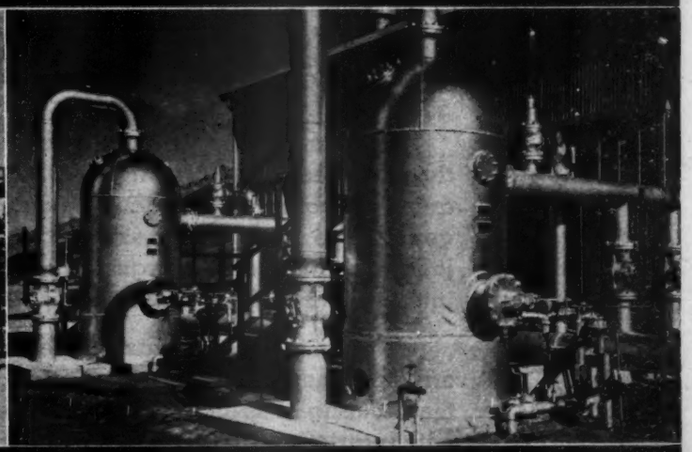
FLUOR ATMOSPHERIC AERATOR TYPE COOLING TOWERS



FLUOR INDUCED AND FORCED DRAFT COOLING TOWERS



FLUOR AIR COOLED MUFFLERS—Cool, Quiet, Economical, Safe



FLUOR GAS CLEANERS—Remove Entrained Liquids and Solids

SINCE 1890

FLUOR

DESIGNERS • ENGINEERS • CONSTRUCTORS

THE FLUOR CORPORATION LTD. *Main Offices & Plant:* 2500 SOUTH ATLANTIC BOULEVARD, LOS ANGELES, CALIFORNIA

R C A Building, New York City, N. Y. • 545 William Penn Way, Pittsburgh, Pa. • 703 Fairfax Bldg., Kansas City, Mo. • 1501 Mellie Esperson Bldg., Houston, Texas

One of the many crossings on the Big Inch Line constructed by Williams Brothers Corp.

LIFELINE OF LIBERTY

Over mountains, under rivers—through swamp, prairie and forest—a great stream of petroleum, life blood of mechanized warfare, industry and transportation, will soon be coursing through the new War Emergency Pipe Line. Work starts soon which will more than double the length of this world's largest pipe line and extend this great steel artery into the heart of the industrial East.

Williams Brothers was privileged to contribute the weight of its modern equipment, broad experience and trained army of skilled workmen in the building of strategic parts of the original Big Inch pipe line; accepts with patriotic determination their share of the responsibility of extending this vital Lifeline of Liberty

WILLIAMS BROTHERS CORP.

GENERAL CONTRACTORS **ENGINEERS**

Oil—Gas—Gasoline—Water Pipe Lines and Pump Stations

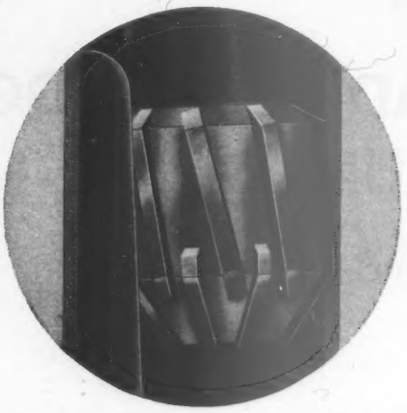
NEW YORK • TULSA • ATLANTA • HOUSTON

EL SIMBOLO DE CALIDAD CONOCIDO EN TODO EL MUNDO

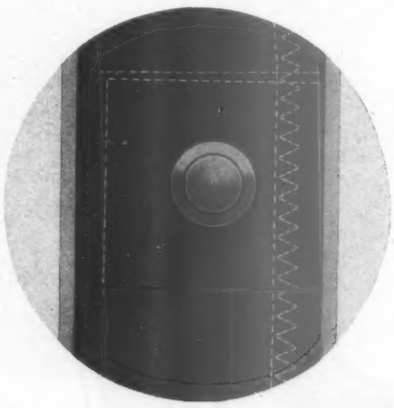
30 CHURCH STREET

NEW YORK
U. S. A.

THE SYMBOL OF QUALITY KNOWN THROUGHOUT THE WORLD



Used in connection with the Kinzbach Whipstock the Kinzbach spiral blade mill cuts a long, clean, consistent window every time.



The hinged feature insures that the top of the whipstock will lie back against the wall of the pipe at all times.

By setting in the coupling, the window will always be within the one joint of casing, eliminating any chance of parting the casing string.

WORLDWIDE ACCEPTANCE WORLDWIDE PERFORMANCE

The Kinzbach Patented Whipstock has saved time, trouble and money for operators since introduction to the field 15 years ago. It has been constantly improved to meet advanced drilling methods resulting from increased drilling depths. It has changed sidetracking from an emergency measure to a normal well problem.

Through worldwide performance over a long period it is accepted worldwide as the positive means of sidetracking junk, for straightening crooked holes or establishing a new drilling course, for redrilling workover holes, for plugging back holes, and for directional drilling, by orientation.

Three outstanding features of the Kinzbach Whipstock are pictured and described here. Other reasons for its leadership are as follows: It can be set at any desired depth, requiring no support from bottom. Positive setting of slips prevents all turning or downward movement of whipstock at any time. It can be oriented in the hole to mill out any desired direction. It can be removed from the hole, if required. It can be arranged to trip on bottom or in internal flush pipe where the pipe is not exposed, such as welded pipe. It is the user's insurance against the complications of a severed string, such as: An unsupported nipple at the bottom end of the upper section of the string which might unscrew or break off in the hole . . . relative shifting of casing sections in the hole . . . or, loss of the pipe section as a support and guide for deflecting tools.

Get full details from your Composite Catalog . . . or write for a Kinzbach Catalog.

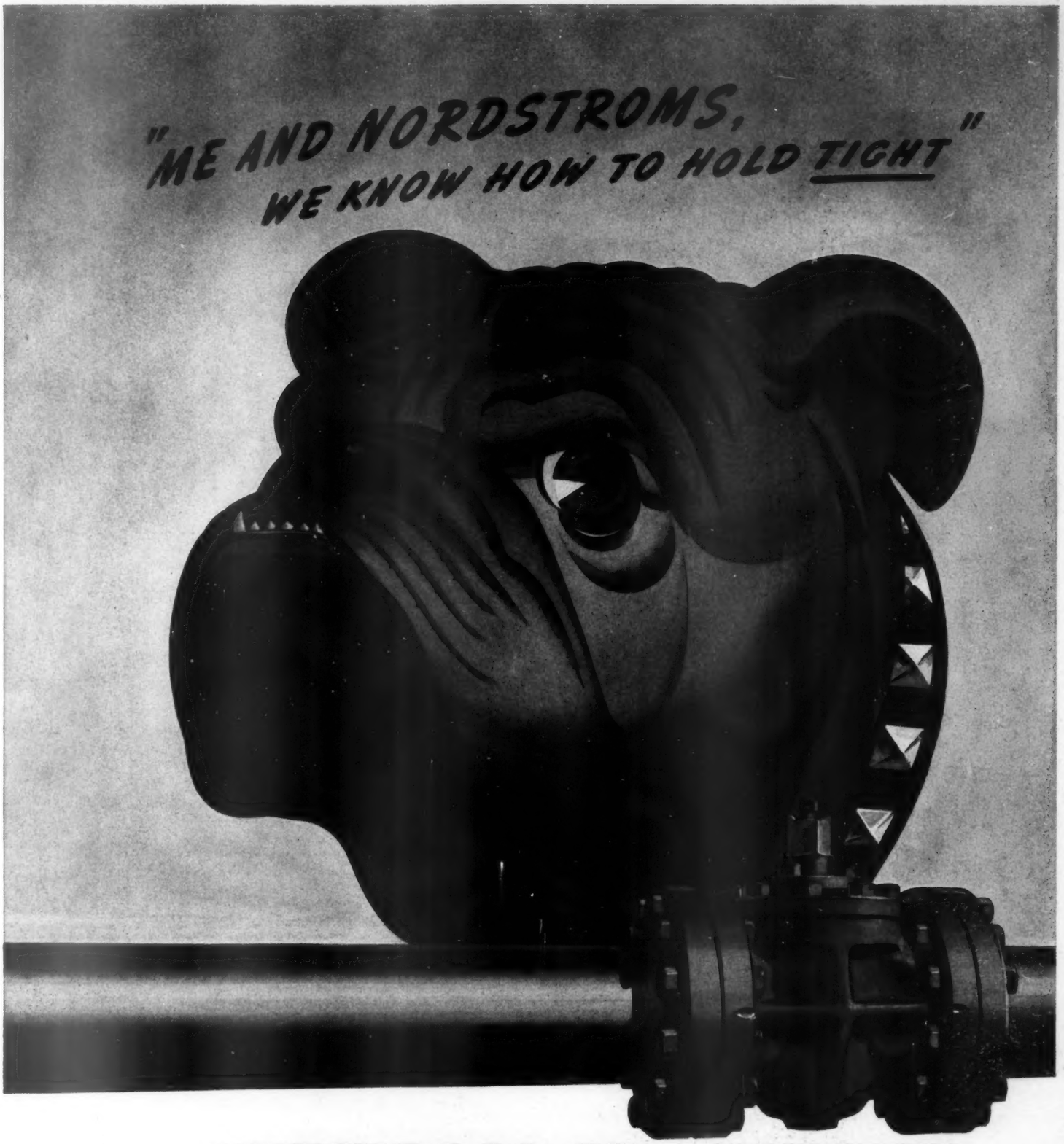
KINZBACH
TOOL COMPANY, INC.

California Representative:
S. R. Bowen Company

Export Office:
74 Trinity Place, N.Y.C.

Patented

For detailed information, check No. 532 on reply card.



WATCHDOGS OF THE FLOW LINES

Nothing can pass a Nordstrom when it's in closed position. It's a watchdog in every sense of the word. Even if your line is accidentally loaded to twice the rated pressure of the valve, the latter will still hold tight. It's the rugged valve with precision fit that keeps upkeep down.

The most valve for your money

Because...

Sealing surfaces are never exposed to line contents; fully protected against corrosion and erosion.

Positive shut-off is assured regardless of how frequently or infrequently the valve is operated.

Efficient operation is maintained many times longer than other types.

Nordstrom Lubricated Valves are of the plug cock type; the simplest of all valve designs. They require the minimum of working parts. Only the plug turns, to open or close.

The patented lubrication system assures quickest, easiest operation.

Lubricant under hydraulic pressure seals the ports against all leakage.

Ask for Bulletins

MERCO NORDSTROM VALVE CO.

A Subsidiary of Pittsburgh Equitable Meter Co.

WORLD'S LARGEST MANUFACTURERS OF LUBRICATED PLUG VALVES; GASOLINE, OIL AND GREASE METERS

Main Office: 400 Lexington Ave., Pittsburgh, Penna.

SALES OFFICES: Boston, Brooklyn, Buffalo, Chicago, Columbia, Des Moines, Houston, Kansas City, Los Angeles, Memphis, New York City, Philadelphia, Pittsburgh, Seattle, San Francisco, Tulsa • *CANADIAN Licensees:* Peacock Bros., Ltd., Montreal • *EUROPEAN Licensees:* Audley Engineering Co., Ltd., Newport, Shropshire, England • *SOUTH AMERICAN Representative:* The Armco International Corporation • *Main Office:* Middletown, Ohio

NORDSTROM VALVES

—KEEP UPKEEP DOWN

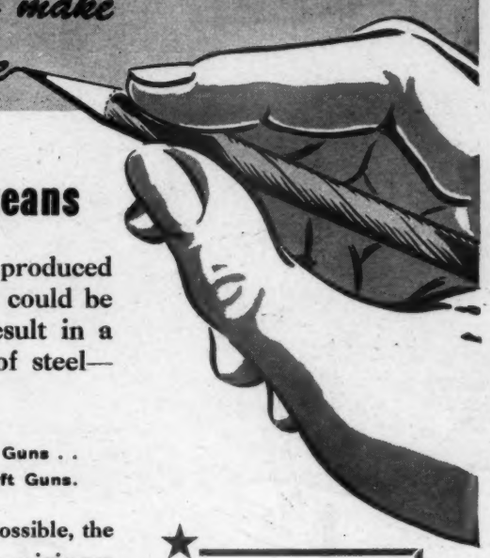
LET'S Do Some Figuring

344,966,000 POUNDS ★

5% LONGER LIFE

17,248,300 STEEL SAVED

+ the Man-hours required to make 17,248,300 lbs. of wire rope



NOW... Let's see what that means

344,966,000 pounds of wire rope were produced in 1941. If (by better use and care) its life could be increased a mere five per cent, it would result in a saving of approximately 17,248,300 pounds of steel—which would be sufficient to make:

1,277,652 3" Shells . . 172,483 50-calibre Machine Guns . . 8,624 4-ton "Block Busters" . . 1,437 3" Anti-Aircraft Guns.

While ideal working conditions are not always possible, the five per cent saving suggested in our example is a minimum of what might be expected with a little *additional* care. Let us help you get maximum "mileage" out of the wire rope you are now using. A copy of our 44-page illustrated booklet, "Practical Information on the Use and Care of Wire Rope", is yours for the asking, and our experienced Engineering Department is always at your service.

★ This is the quantity of wire rope produced in 1941 *only*. If this longer life—a mere five per cent—could be obtained from all wire rope now in use, the steel saving would be much greater.

A. LESCHEN & SONS ROPE CO.

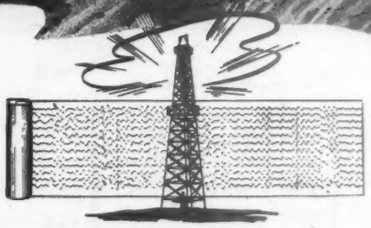
WIRE ROPE MAKERS — ESTABLISHED 1857

5909 KENNERLY AVENUE — ST. LOUIS, MISSOURI, U. S. A.

NEW YORK . . . 90 West Street
CHICAGO . . 810 W. Washington Blvd.
DENVER . . . 1554 Wazee Street

HERCULES RED-STRAND WIRE ROPE

SAN FRANCISCO . . 520 Fourth Street
PORTLAND . . 914 N. W. 14th Avenue
SEATTLE . . 3410 First Avenue South



Tomorrow's Drilling
Accurately Planned Today . . .

Today, perhaps in any one of our forty-eight states, GENERAL'S trained and skilled crews are gathering information and facts on the location of the oil to be produced in the future . . . the oil to meet tomorrow's demands for Petroleum Synthetics and higher octane gasolines. They are at work compiling accurate sub-surface data based on proven principles and methods of modern seismology.

These modern geophysicists are available to aid in planning your future drilling programs.

General
GEOPHYSICAL COMPANY HOUSTON

PULLING WIRES FOR PEACE!

Mile after mile of wires are being processed to speed the war effort and to hasten peace.

Day and night, the finest of steel passes through scientifically-controlled patenting furnaces, steaming vats that clean and coat, and baking ovens that dry and degasify. With unrivalled skill, through dies of jewel-like precision, it is drawn down to wire.

With scarcely a pause, spools of it in great numbers are cradled in the awesome whirr of robot-like stranding and laying machines. There, just as steadily as they were drawn down, wires are laid up again, first into strands and then into rope. In each process, strength is gained to supply tough, flexing sinews for machines which multiply and quicken man's capacity ten thousandfold.

As never before, with ever-increasing skill, our craftsmen are producing tough steel tendons for fighting machines. Before there can be war machines, however, ores, oil, coal and stone must be mined. Steel and metals must be made, lumber logged, war plants constructed and fitted. Then there must be highways, seaports and airports hewn out of the earth around the globe.

Think! Try to imagine what a limitless, hopeless, man-killing job it would be without modern wire rope to do the digging, shoveling, hoisting and countless other burdensome tasks. Then resolve to use your wire rope with great care.

UNION WIRE ROPE CORPORATION
2102 Manchester Ave., KANSAS CITY, MO.

Tulsa • Houston • Chicago • Salt Lake City • New Orleans
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C-43

SEND FOR ROPE DOPE • Tells how to make wire rope last longer—how to handle and install it—how to socket or splice—and a wealth of other helpful information. Engineering information supplied without obligation.

WHEN YOU NEED PREFORMED WIRE ROPE
SPECIFY **union-formed**

union *Wire Rope*
"THE ULTIMATE LOW COST WIRE ROPE"

SUPERIOR QUALITY

in every detail

1 **GLASS AFFORDED EVERY PROTECTION.** Frame completely contains the glass so that no part is exposed. Weight of frame entirely supported by liquid chamber gland . . . not by glass.

2 **UNIFORM GASKET PRESSURE ASSURED** by accurate finishing of the retaining surfaces to very close tolerances.

3 **EQUAL RESILIENCE ON BOTH SIDES OF GLASS** due to interchangeable gaskets which also eliminate possibility of improper reassembly in field.

4 Spacing band centers glass and prevents contact with metal.

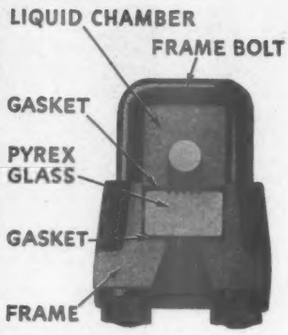
5 **PERFECT GASKET JOINTS WITH MINIMUM BOLT TENSION** because misalignment of parts is impossible, which also eliminates frequent cause of glass breakage.

6 **DISTORTION PREVENTED** by reinforcing beam and scientific distribution of metal in frame. (Distortion causes excessive strains in glass and results in breakage.)

7 **GASKET BLOW-OUTS PREVENTED** by full metal backing of entire surface and periphery of both gaskets.

8 **RIGIDITY AND PERFECT ALIGNMENT** are assured by machining liquid chamber from a solid block of temperature resisting steel heat treated to prevent warping.

9 **PYREX GLASS** is used exclusively because of its greater strength and resistance to thermal shock and erosion. Exhaustive comparative tests have proven conclusively that Pyrex glass is the highest grade obtainable for the service.



EMPTY SPACE SHOWS **WHITE**
LIQUID SHOWS **BLACK**

PENBERTHY DROP FORGED STEEL REFLEX LIQUID LEVEL GAGES

THESE Penberthy Reflex Gages are made in whatever lengths required and for various liquids; they conform with A.P.I.-A.S.M.E. requirements and are recommended for pressures up to 3000 lb. p.s.i. at 100° F. and 1000 lb. at 1000° F. Write for Catalog 34-A for complete information.

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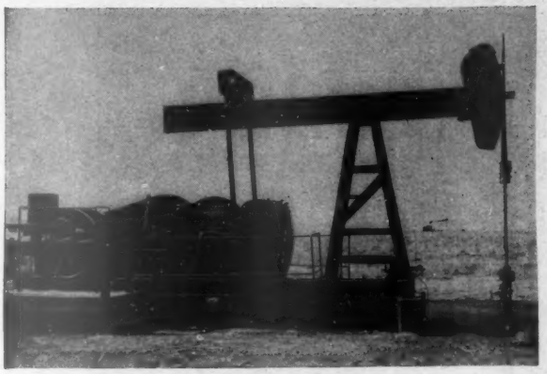
PENBERTHY INJECTOR COMPANY

Manufacturers of Quality Products Since 1886 • DETROIT [illegible] Windsor, Ont.

Profitable Production Products



OCS Pumper

PUMPERS

OCS POLLY — Double Reduction — 7 to 135 H.P.

OCS BAT — Single Reduction — 24 to 132 H.P.

OCS Portable Pumpers
GOSLIN, DUCK or DRAKE
Double Reduction 14 to 44 H.P.

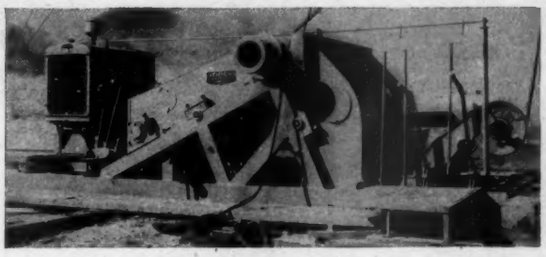
WORKOVER RIGS

For Cable Tool or Rotary

MOBILITY Easily moved from well to well, lease to lease or over highways.

FACILITY Easily, quickly changed from cable tool to rotary tool work-over unit; vice versa.

UTILITY Design and flexibility make unit entirely suitable for drilling, spudding, swabbing or bailing operations.



OCS Workover Rig

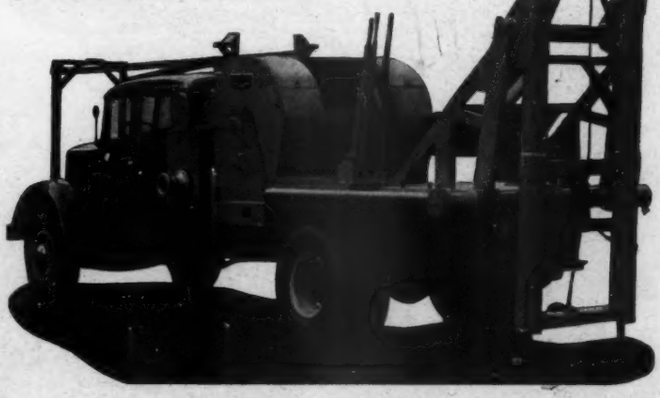
OCS Streamlined Drawworks

STREAMLINED DRAWWORKS

Four-speed mechanical drilling rig with hydraulic transmission. Has characteristics of steam rig. Flexibility and torque capacity of five to one in any speed without shifting speed ratios. Holds load or pull without killing engine. Designed to give steam engine performance.

SERVICING WINCHES

Gives new values and advantages not previously available in portable well servicing units. Insures heavy duty radiation and other motor truck improvements at variable speed automobile transmission selectivity. Unusual speed, efficiency and maneuverability. Self-contained, self-propelled, complete on one truck.



OCS Servicing Winch

RIG FRONTS • HOISTS • SAND REELS • PULLEYS • CLUTCHES • WALKING BEAMS • SAMSON POSTS • HANGERS • PITMANS

THE PARKERSBURG RIG & REEL CO.

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Sales and Service Branches in All Active Fields
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Drilling to 4,500 ft.
in 4 to 5 Days
in South America
With FRANKS
TRUCK-MOUNTED RIGS

SAVE UP TO 25% BY USING FRANKS RIGS

A Franks rig, such as the one shown — complete with derrick, drawworks, pumps, power plant, rotary table, swivel, kelley, crown block, stacking board and all essential equipment — costs approximately one-half as much as the cost of the old type drilling rig with comparable equipment. Add to this **savings** in original cost — **savings** in labor, fuel, water, casing program, rig-up, tear-down, and moving — and it is easy to see how you can save 25% or more by using a Franks rig. In addition, you save steel for our war effort.

One of Franks 100 percent portable truck-mounted rigs which are drilling in (censored), South America. Inset shows rig in over-the-road position.

See the Composite Catalog
or write for
additional information
Export Representative
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FRANKS MFG. CORP.
WELL SERVICING AND DRILLING UNITS
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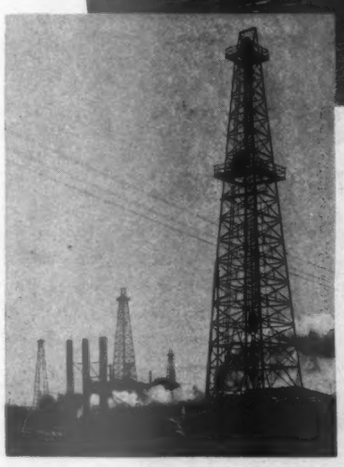
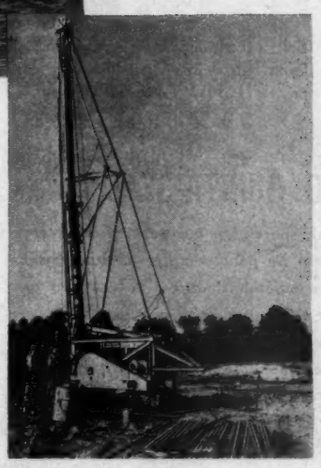
The CORRECT lines for your equipment

MACWHYTE WIRE LINES

Cable Tool Lines	"Hi-Lastic" Lines
Rotary Lines	Torpedo, Winch Lines
Casing, Tubing Lines	Monel Metal Wire Rope
Sand, Bailing Lines	Braided Wire Rope Slings





The Macwhyte Company manufactures many types of wire rope used in construction, mining, industrial equipment, building elevators and for oil field equipment. Macwhyte has long been a leading supplier of quality wire lines for the great American oil industry.

This reputation, earned as a result of many years of manufacturing quality wire rope, is worthy of your consideration. For the duration of the present world-wide war the Macwhyte Company will do everything possible to serve you.

La Macwhyte Company fabrica muchos tipos de cable de alambre usados en obras de construcción, minería, equipo industrial, ascensores de edificios y explotación de petróleo. La Macwhyte, desde hace tiempo, ha sido una de las principales abascedoras de cables de alambre de la gran industria petrolera americana.

Esta reputación, que se deriva de muchos años dedicados a la fabricación de cable de alambre de superior calidad, es muy digna de su consideración. Durante el período de la presente guerra mundial, la Macwhyte Company hará todo lo posible por servir a sus clientes en el extranjero. Toda correspondencia dirigida a nuestro departamento de exportación recibirá inmediata y esmerada atención.

6470

MACWHYTE COMPANY

2916 Fourteenth Avenue

KENOSHA, WIS., U. S. A.

Manufacturer of wire rope—left-and-right lay braided wire rope slings—Monel Metal wire rope—Stainless Steel wire rope—Aircraft cables and tie-rods, "Safe Lock" Swaged Terminals—and wire ropes to meet every need. Distributors and Factory Warehouse Stocks in All Principal Oil Fields.

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PARA REDUCIR LOS GASTOS DE PRODUCCION ELIJA LOS PRODUCTOS LANE-WELLS

Tipo de circulación B
Tipo de producción A
Tipo de pared delgada

TAPONS U OBTURADORES LANE-WELLS

Como el fabricante y distribuidor más grande de tapones para petróleo y gas, la Lane-Wells construye tapones que satisfacen cumplidamente toda condición que requiera el uso de estas herramientas especiales. Los tapones Lane-Wells Quinta-Seal y los tapones Lane-Wells Olympic, en cuatro tipos básicos—para producción, circulación, pared delagada y ensayo, se ofrecen en tamaños que responden a las condiciones de trabajo que generalmente se presentan en la mayor parte de los campos petrolíferos.

Los tapones especiales, proyectados para adaptarse a condiciones extraordiarias de pozos o para satisfacer las preferencias individuales de los ingenieros, han constituido una gran parte del negocio de tapones de la Lane-Wells desde hace muchos años. Todos los tapones Lane-Wells se proyectan y fabrican para un servicio muy durable y satisfactorio.

Los tapones Lane-Wells de tipo Olympic son dotación normal en todo el mundo entre las grandes compañías ensayadoras de formaciones. Con cada tapón Lane-Wells que sale de la fábrica, va una tarjeta que contiene instrucciones completas para su uso correcto.

En los boletines sobre tapones Lane-Wells damos información detallada sobre estos productos. Pida estos boletines a nuestra oficina principal, 5610 South Soto Street, Los Angeles, California, E.U.A.

De pared delgada, tipo CO
Tipo de circulación BO-C
Tipo de producción AO

TAPONES DE TIPO QUINTA-SEAL

Los tapones Lane-Wells, tipo Quinta-Seal, sobresalen por su servicio invariablemente seguro bajo todas las condiciones de pozo. Su tipo multianular los hace muy seguros, fáciles de instalar, con amplia superficie de contacto para establecer un cierre positivo y resistencia a las altas presiones de gas. Los patines de aleación de acero tratada termicamente dan una sujeción positiva sin cortar. El cuerpo de firme tubería o revestimiento sin costura tiene el mismo diámetro interior que la columna en que se corre el tapón. La superficie de circulación es bastante grande para permitir el trabajo a velocidades normales.

TAPONES DE TIPO OLYMPIC

Los tapones Lane-Wells, tipo Olympic, se fabrican especialmente para que funcionen muy bien bajo las condiciones de trabajo más exigentes. Tienen cuatro o más anillos de lado plano para responder a las características de ensayo de formaciones. Pueden colocarse de nuevo varias veces. Los patines de tipo especial y la jaula de movimiento libre son rasgos de funcionamiento que permiten que este tipo de tapón pueda usarse muy bien en trabajo especial de corriente de gas y líquido. Estudie estos tapones con cuidado y compárelos con las especificaciones de los tapones que Vd. necesita para su propio trabajo.

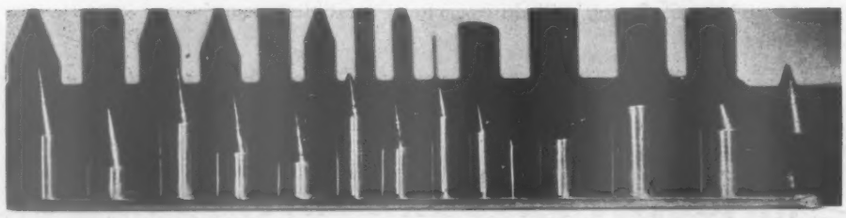
PISTOLA DE PERFORACION LANE-WELLS

Las compañías de petróleo más emprendedoras en la América del Sur saben que los equipos de pistola de perforación Lane-Wells reducen los gastos de perforación, debido a que se prestan a fácil manejo por parte de los operarios de las mismas empresas petroleras. El perforador Lane-Wells permite a la empresa petrolera el uso de modernos métodos de terminación en pozos de perforación, facilitandole la obturación para la producción de zonas secundarias en pozos revestidos. Actualmente hay seis equipos de pistolas perforadoras Lane-Wells trabajando en diversos campos petrolíferos sudamericanos. Los tipos de proyectiles ofrecidos se ilustran aquí a la derecha. Están proyectados especialmente para dar penetración profunda con máxima seguridad y exactitud.

Para información completa sobre los equipos de pistolas perforadoras Lane-Wells, proyectados para usarse en la América del Sur, sírvase escribir a la Lane-Wells.

BALAS DE PISTOLA DE PERFORACION LANE-WELLS

NO.	TAMAÑO DE BALA	OBSERVACIONES
1.	9/16 x 1-7/16	Penetración profunda.
2.	9/16 x 1	Penetración profunda.
3.	15/32 x 1-7/8	Penetración profunda.
4.	15/32 x 1-1/8	Penetración profunda.
5.	15/32 x 1	Penetración profunda.
6.	3/8 x 1-3/8	Penetración profunda.
7.	3/8 x 1	Penetración profunda.
8.	1/4 x 3/16	Penetración profunda.
9.	1/4 x 1	Penetración profunda.
10.	1/16 x 5/8	Especial—Perforación de tubo.
11.	15/32 x 5/8	Especial — Plana — Poca penetración.
12.	9/16 x 1	Tipo hongo—Chata—Punta hueca —Para remover sección de revestimiento.
13.	9/16 x 1	Tipo medio hongo—Punta truncada—Para romper cemento debilitado.
14.	9/14 x 1-7/8	Tipo levemente hongo — Forma normal—Blando—Para romper el cemento detrás de la tubería.



1 2 3 4 5 6 7 8 9 10 11 12 13 14

LANE-WELLS COMPANY — TECHNICAL OIL FIELD SERVICES

Fábrica y oficinas generales
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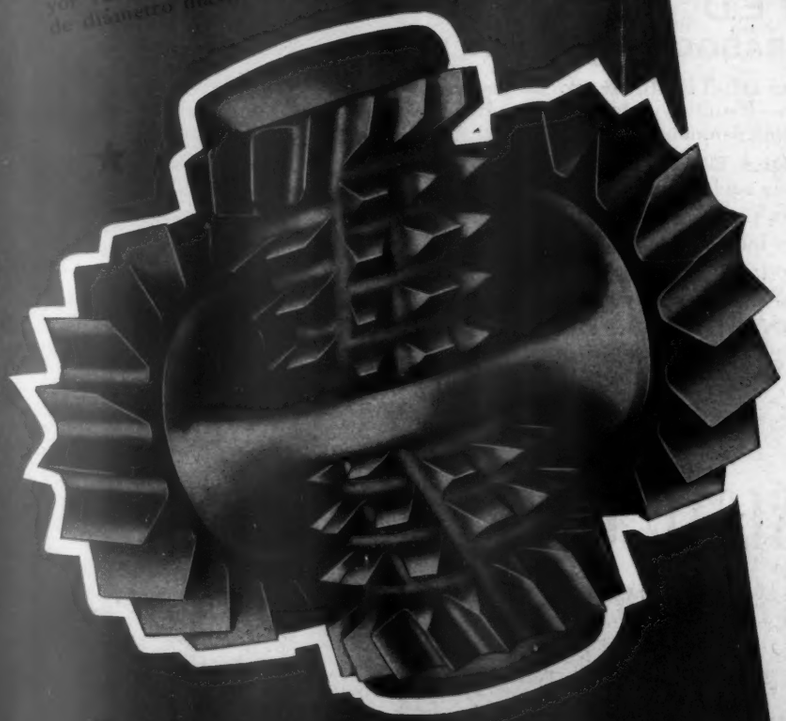
LATIN AMERICAN OPERATORS Cut Drilling Costs

H.C. SMITH ROCK BITS



FASTER CUTTING ACTION
Straighter Full Gauge Hole

Superior design, scientific engineering, precision manufacture and sturdy construction, combine to make H. C. Smith Rock Bits the choice of operators who want faster cutting action, greater footage, and maximum full gauge hole. ★

H C Smith Oil Tool Co.

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EQUIPMENT FOR ALL TYPES OF OPERATIONS ★ *Reflection Seismograph—Refraction Surveys—Dip Shooting—Continuous Profile—Three-dimensional Surveys*

UNEXCELLED RESEARCH FACILITIES *for development of the most advanced methods and equipment*

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A STRICTLY INDEPENDENT CONSULTING ORGANIZATION ★*having no connection with any petroleum interest*

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EXTRAORDINARIAS FACILIDADES DE INVESTIGACION para el desarrollo de los métodos y equipo más adelantados.

EXACTA TECNICA INTERPRETATIVA ★ basada sobre resultados muy satisfactorios en muchas diferentes localidades.

EXPERIENCIA EN INVESTIGACIONES EN EL PAIS Y EL EXTRANJERO ★ bajo una amplia escala de difíciles condiciones de campo.

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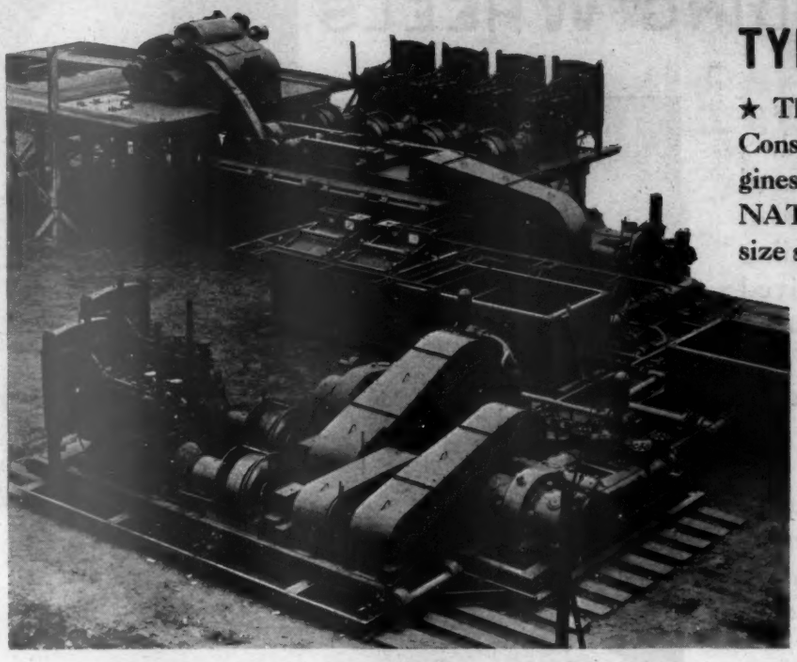
A COMPLETE GEOPHYSICAL AND GEOLOGICAL SERVICE

World's Largest Power Rig



TYPE 125 CONSOLIDATED RIG

★ The illustration shows a NATIONAL Type 125 Consolidated Rig with 4 Internal Combustion Engines, 3 Power Pumps, and 6 Hydraulic Couplings. NATIONAL produces a complete range of Rigs—a size suitable for every need.

APAREJO CONSOLIDADO, TIPO 125

★ El grabado muestra un aparejo, consolidado NATIONAL, tipo 125, con 4 motores de explosión interna, 3 bombas mecánicas y 6 acoplamientos hidráulicos. La NATIONAL produce una escala completa de aparejos—un tamaño adaptado a cada requisito.

Type	Recommended Drilling Depth Using Drill Pipe 3½"	4½"	H. P. Rating	Number of Speeds Hoisting	Rotary	Drum Size Diam. & Length, inches
30	3,000′	------	100	4	4	16 x 36
40	5,000′	4,000′	150	4	4	16 x 44
50	7,500′	5,000′	350	6	3	16 x 34
75	10,000′	7,500′	500	6	3	23½ x 35
100	12,000′	10,000′	650	6	3	26 x 46
125	14,000′	12,500′	950	6	6	28 x 42

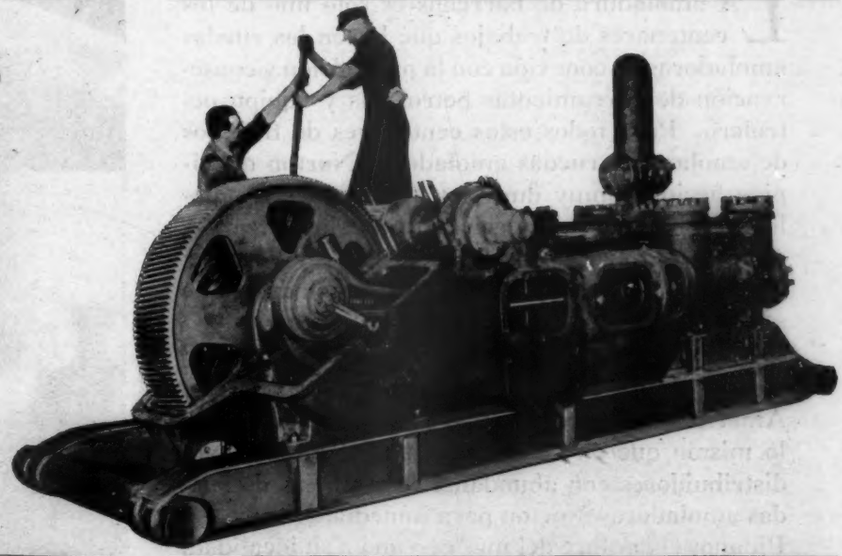
Tipo	Profundidad de perforación recomendada, usando tubo de perforación de 3½"	4½"	cdl.	Número de velocidades De levantamiento	De rotativa	Tamaño de tambor Diámetro y longitud en pulg.
30	3,000′	------	100	4	4	16 x 36
40	5,000′	4,000′	150	4	4	16 x 44
50	7,500′	5,000′	350	6	3	16 x 34
75	10,000′	7,500′	500	6	3	23½ x 35
100	12,000′	10,000′	650	6	3	26 x 46
125	14,000′	12,500′	950	6	6	28 x 42

TYPE C-350 POWER PUMPS

There is a proper Power Pump selection for each of the above rigs, in accordance with horsepower and working pressure requirements.

BOMBAS MECANICAS, TIPO C-350

Hay una bomba mecánica exactamente adaptada a cada aparejo de los anotados arriba, de acuerdo con la fuerza motriz y las presiones de trabajo requeridas.



SIZE	H.P. INPUT	HYDRAULIC OUTPUT	WORKING PRESSURE	GROSS WEIGHT
D-50 5" x10"	59	50	1000 lbs.	6200 lbs.
C-100 6¼"x10"	118	100	1500 lbs.	12500 lbs.
C-150 6¼"x12"	177	150	2000 lbs.	17900 lbs.
C-250 7¼"x15"	294	250	2500 lbs.	31000 lbs.
C-350 7¾"x18"	412	350	3000 lbs.	39000 lbs.

TAMANO	C. de F.	RENDIMIENTO HIDRAULICO	PRESION DE TRABAJO	PESO BRUTO
D-50 5" x10"	59	50	1000 lbs.	6200 lbs.
C-100 6¼"x10"	118	100	1500 lbs.	12500 lbs.
C-150 6¼"x12"	177	150	2000 lbs.	17900 lbs.
C-250 7¼"x15"	294	250	2500 lbs.	31000 lbs.
C-350 7¾"x18"	412	350	3000 lbs.	39000 lbs.

THE NATIONAL SUPPLY CORPORATION

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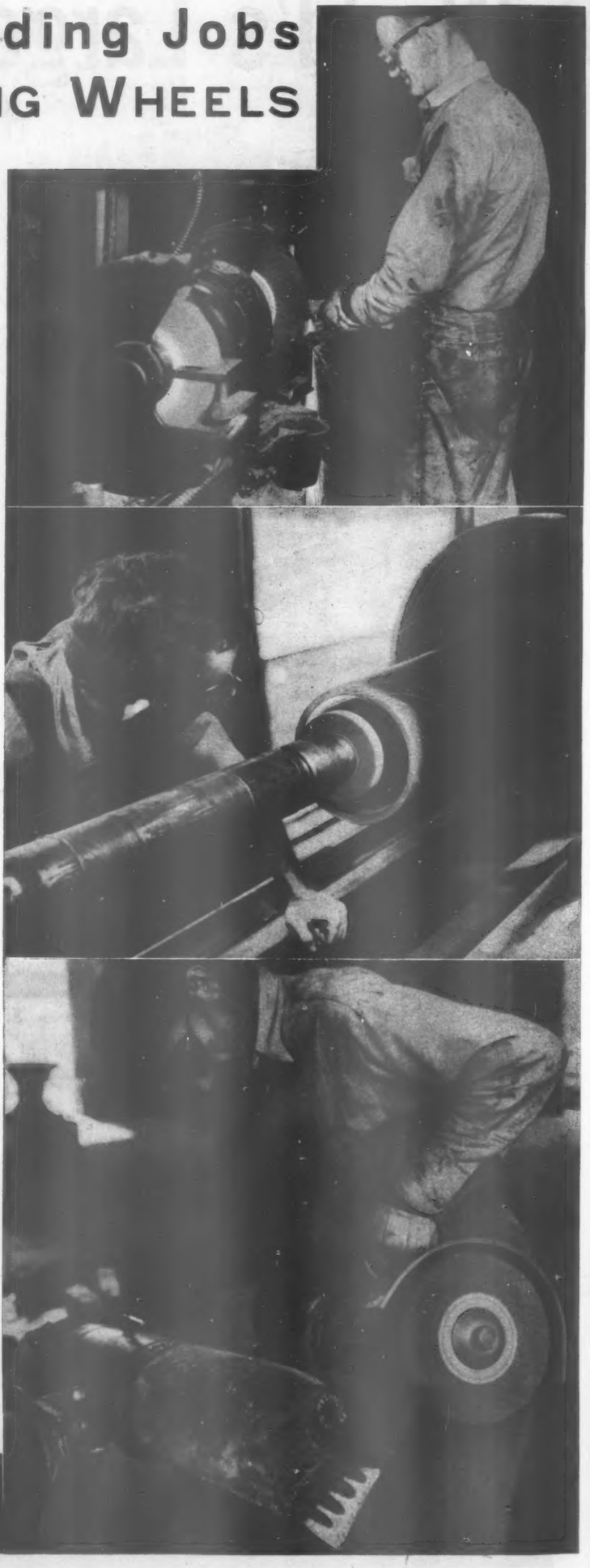
For All Your Grinding Jobs ... NORTON GRINDING WHEELS



BIT grinding is but one of the hundreds of jobs for abrasive wheels in the production and maintenance of oil field tools and equipment. For all of these hundreds of grinding jobs there are Norton Grinding Wheels that are fast cutting and long lived —wheels developed by the Norton research laboratories to meet the various types of grinding problems found in the petroleum industry.

In over 150 cities in the United States, throughout Central and South America and in other countries there are Norton distributors with grinding wheels in stock. Write for the name of the nearest.

Para todo trabajo de amolar
en la industria del petróleo . . .

RUEDAS DE AMOLAR NORTON

LA amoladura de barrenas es sólo uno de los centenares de trabajos que hacen las ruedas amoladoras en conexión con la producción y conservación de herramientas petroleras y equipo petrolero. Para todos estos centenares de trabajos de amolar hay ruedas amoladoras Norton de rápida acción y muy durables. Estas ruedas amoladoras han sido perfeccionadas en los laboratorios de la Norton, a fin de satisfacer y resolver los varios tipos de problemas de amoladura que se presentan en la industria del petróleo.

En más de 150 ciudades en los Estados Unidos de América, América Central y América del Sur, lo mismo que en otras naciones del mundo, hay distribuidores con abundantes existencias de ruedas amoladoras Norton para inmediates entregas. Pídanos el nombre del más cercano a su localidad.

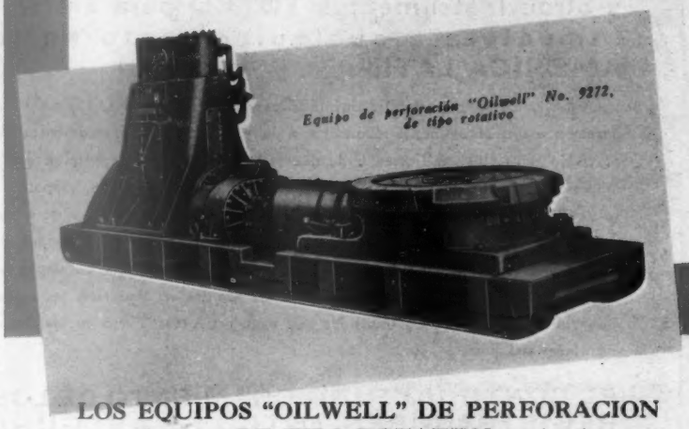
NORTON COMPANY
Worcester, Mass., U. S. A.

W-897

NORTON ABRASIVES

En todo lugar donde se perforan pozos

SE PUEDE DEPENDER DE LA SEGURIDAD DEL EQUIPO "OILWELL"



Equipo de perforación "Oilwell" No. 9272, de tipo rotativo

El completo surtido "Oilwell" comprende equipo y abastecimientos eficaces y seguros para todas las necesidades de perforación y producción de campos petrolíferos. En esta página mostramos unos pocos modelos de maquinaria de perforación. Para información sobre equipo adaptado a sus requisitos particulares, sírvase escribir a una de las oficinas anotadas abajo.

LOS EQUIPOS "OILWELL" DE PERFORACION DE TIPO ROTATIVO

El equipo "Oilwell" de perforación de tipo rotativo reduce el desgaste y avería de la máquina de izar y aparejo de maniobras, da al perforador un gobierno más exacto y flexible de la barrena y en general, imparte un funcionamiento más expedito y seguro a todo el equipo de perforación.

Los equipos "Oilwell" de perforación de tipo rotativo se suministran con motores de vapor o de explosión interna, y con una amplia selección a rotativas para satisfacer los requisitos individuales. El peso de exportación del completo equipo "Oilwell" No. 9272 de perforación de tipo rotativo, aquí ilustrado, es 30.800 libras.

Tres tamaños de rotativas "Oilwell", cada uno con base de construcción enteriza, engranajes helicoidales cónicos tratados termicamente y lubricación circulante de baño de aceite, se suministran con los equipos "Oilwell" de perforación de tipo rotativo:

Tipo	17½" con baño de aceite	21" de super velocidad	27½-A con baño de aceite
Profundidad nominal de perforación	7500 pies	17.000 pies	17.000 pies
Capacidad de peso muerto	200 toneladas	300 toneladas	300 toneladas
Velocidad máxima del plato o mesa	400 rpm.	1000 rpm.	400 rpm.

CABALLETES PORTAPOLEAS "OILWELL" FIJOS Y MOVILES

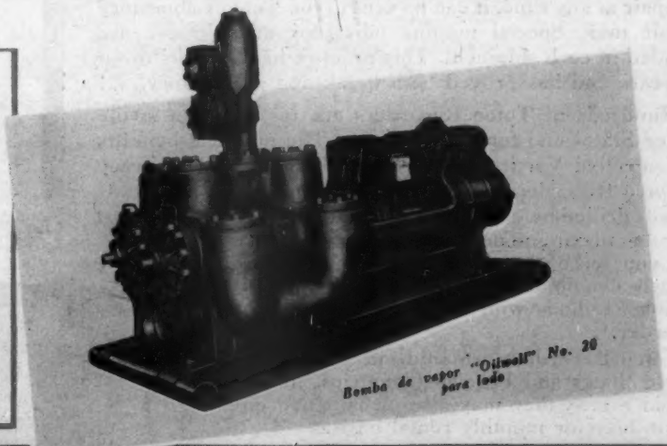
Para cada caballete portapoleas "Oilwell" fijo hay un correspondiente caballete portapoleas "Oilwell" fijo de estilo perfilado, con roldanas de aleación de acero y manganeso y cojinetes de rodillos de trabajo pesado completamente intercambiables.

Caballete portapoleas fijo	No. 110	No. 110	No. 200-15"	No. 250	No. 350
Número de roldanas	4	5	5	6	6
Peso de exportacion, lbs.	3.105	3.578	5.980	6.100	8.675
Caballete portapoleas móvil					
Número de roldadas	60"	60"	66"	66"	80"
Peso de exportación, lbs.	3	4	4	5	5
Diám. ext. de las roldanas	3.210	4.020	5.250	6.400	11.200
Capacidad de carga, toneladas	34"	34"	36"	36"	46"
	110	110	200	250	350

LAS BOMBAS DE VAPOR "OILWELL" No. 18 y No. 20 PARA LODO

Estas firmes y durables bombas duplex son famosas en todos los campos petrolíferos en virtud de su seguridad y económica conservación:

Número de tipo de la bomba	No. 18	No. 18	No. 20
Material del cilindro hidráulico	Semi-acero	Acero fundido	Acero fundido
Diám. int. del cilindro de vapor	14"	14"	16¼"
Diám. int. máximo del forro del cilindro hidráulico	7¼"	7⅛"	7¾"
Carrera de émbolo	18"	18"	20"
Presión nominal de vapor, en libras por pulg. cuadrada	400	350	350
Presión nominal de trabajo de la cámara hidráulica:			
Aspiración—lbs. por pulg. cuad.	1000	2000	2000
Descarga—lbs. por pulg. cuad.	1800	3000	3000
Peso de exportación, en libras	15.000	16.030	21.750



Bomba de vapor "Oilwell" No. 20 para lodo

OIL WELL SUPPLY COMPANY

OFICINA GENERAL—DALLAS, TEXAS
OFICINA DEPTO. DE EXPORTACION
30 ROCKEFELLER PLAZA, NEW YORK CITY

SUCURSALES EN
BUENOS AIRES — MARACAIBO
RIO DE JANEIRO — TAMPICO

TOTCO RECORDERS

FULL STOCKS OF TOTCO Recorders and Equipment for Delivery Anywhere in the Americas

Although the manufacturing facilities of Technical Oil Tool Corporation are now employed in the production of precision instruments for war, ample stocks of Totco Recorders, go-devils and accessory equipment are still available to the oil industry. Approved export orders are filled promptly at the main Totco warehouse. In the United States, warehouse stocks are maintained at—strategic locations, ensuring adequate service for Totco users in all drilling areas.

CONTINUOUS PERFORMANCE OF TOTCO RECORDERS ENSURED BY THIS WORLD-WIDE GUARANTEE

The precision workmanship and high quality materials of Totco Recorders and equipment are unchanged. Hence, you can expect from them the same dependable service as in the past, and the Totco Guarantee fully covers your newly purchased Totco Recorder Instruments.

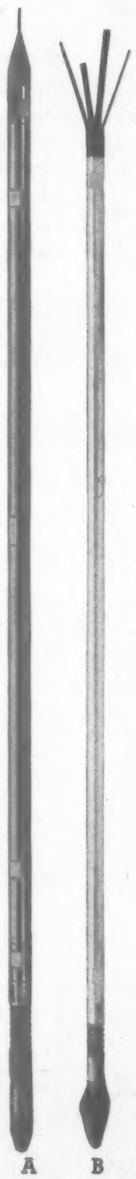
Here are the terms of the Totco Guarantee: "All Totco Recorder Instruments sold in the United States and Foreign Countries are guaranteed for a period of one year, and will be repaired at our laboratory or replaced free of charge should they fail to operate or to maintain their accuracy when run and cared for according to the instructions contained in the Totco Catalog and Operating Manual which accompanies each shipment."

TOTCO LABORATORY SERVICE QUICKLY AVAILABLE TO ALL USERS OF TOTCO RECORDERS

Should the Totco Recorder Instrument require service or repair at any time, it can be sent to the Totco Laboratory via air mail. Special mailing tubes for this purpose are included in each shipment. This practice has been followed for years and has proved both quick and satisfactory.

Hundreds of Totco Recorders are in daily use in the United States and foreign countries. The practical benefits of Controlled Vertical Drilling and the sustained accuracy of Totco Recorders have been demonstrated in thousands of wells drilled by major operators during the past ten years. Now that maximum drilling efficiency is vital, avail yourself of the advantages to be obtained through the application of Controlled Vertical Drilling methods with the guaranteed Totco Recorder.

Totco Recorders are sold outright in the United States and Foreign Countries. In the United States, they may also be obtained on a term lease or monthly rental basis.



TYPICAL TOTCO OPERATING UNIT AND EQUIPMENT

Above are shown: (A) Totco go-devil for running inside the drill pipe on measuring line, and (B) the same Totco go-devil adapted to be dropped freely inside the drill pipe and recovered when the drill pipe is pulled. Two steel boxes are provided to keep Totco equipment clean and safe at the well. The box in center contains operating supplies and equipment; the long box is for the go-devil, interchangeable top and spear point assemblies, and go-devil cleaning brushes.

EXISTENCIA COMPLETA de registradores y otros instrumentos TOTCO para entrega inmediata a cualquier punto en la AMERICA LATINA

A pesar de que las facilidades fabriles de la Technical Oil Tool Corporation están actualmente dedicadas a la producción de instrumentos de precisión para fines militares o de guerra, tenemos, a la disposición de la industria del petróleo, una completa existencia de registradores, raspatubos go-devil y otros accesorios de la afamada marco Totco. Los pedidos de exportación aprobados se despachan con prontitud del depósito principal de equipo Totco. Mantenemos existencias de nuestros productos en depósitos centrales, en diversos puntos de los Estados Unidos de América, para asegurar un servicio rápido a todos los que usan productos Totco en las zonas petroleras del país.

EL CONTINUO FUNCIONAMIENTO DE LOS REGISTRADORES TOTCO SE ASEGURA POR ESTA GARANTIA MUNDIAL

La construcción precisa y los materiales de fina calidad de los registradores Totco y de otros equipos de esta marca, no han sufrido alteración alguna. Por esta razón, puede Vd. anticipar de ellos ese mismo seguro servicio de siempre. La Garantía Totco da protección completa todos los nuevos instrumentos registradores Totco que Vd. compre.

He aquí las condiciones de la Garantía Totco: "Todos los instrumentos registradores Totco, vendidos en los Estados Unidos de América o en el extranjero, se garantizan por el término de un año, y se repararán en nuestro laboratorio o se renovarán sin gasto alguno, en caso de que dejen de funcionar o de mantener su exactitud cuando son manejados o cuidados de acuerdo con las instrucciones contenidas en el catálogo y manual de operación Totco que se incluye en cada embarque."

EL SERVICIO DE LABORATORIO TOTCO A LA DISPOSICION INMEDIATA DE TODOS LOS QUE USAN REGISTRADORES TOTCO

En caso de que el instrumento registrador Totco requiera ajuste o reparación, en cualquier momento, podrá ser enviado, por correo aéreo, al Laboratorio Totco. Tubo especiales, para el envio por correo, se incluyen en cada embarque. Esta práctica se ha seguido por muchos años y ha dado siempre resultados rápidos y satisfactorios.

Centenares de registradores Totco se usan a diario en los Estados Unidos de América y el extranjero. Los beneficios prácticos de la perforación vertical gobernada y la continua exactitud de los registradores Totco, han sido demonstrados en millares de pozos perforados por gran empresas estos últimos diez años. Agora que es esencial el rendimiento máxima de la perforación, saque Vd. provecho de las ventajas que se derivan de la aplicación de los métodos de perforación vertical gobernada mediante el registrador Totco garantizado.

Los registradores Totco se venden incondicionalmente en los Estados Unidos de América y el extranjero. En los Estados Unidos de América solamente se ofrecen a base de arriendo mensual o por más largos períodos de tiempo.

TIPICO GRUPO DE TRABAJO Y EQUIPO TOTCO

Mostramos arriba: (a) go-devil Totco para pasar por el interior de un tubo de perforación, con un cable de medición, y (b) el mismo go-devil Totco adaptado a introducirse libremente por el interior del tubo de perforación, recobrándose cuando se quita el tubo. Se proveen dos cajas de acero para guardar el equipo Totco, de una manera bien limpia y segura, cerca del pozo. La caja al centro contiene abastecimientos de trabajo y el equipo; la caja larga es para guardar el go-devil, los grupos intercambiables del tope y punta de arpón, y los cepillos para limpiar el go-devil.

Flupaco PUMPS

Save in first cost.

Save in maintenance cost.

Save in power cost.

Save in down-time.

Save in total cost per barrel.

FLUPACO'S advanced manufacturing technique saves vital steel and produces oil well pumps so simple, so long wearing, so efficient that pumping costs are reduced to a minimum.

FLUPACO "GROOVE SEAL" Volume Producer

FLUID PACKED PUMP Positive Pull Type

FLUPACO "GROOVE SEALS"

Provide 4 to 8 times harder barrels than ordinary pumps. These economically priced Pumps are licking the tough jobs everywhere. Longer production and fewer replacement needs make these hardened and honed one-piece barrel pumps today's outstanding value.

THE VOLUME PRODUCER. Recommended for large volume wells and for wells of normal volume and depth.

THE PRODUCER. For wells of medium depth and volume and for stripper wells where pump and power costs must be kept at the lowest point.

PETROL "A." Designed for wells of comparatively small volume and shallow depth, even where operating conditions are severe.

FLUID PACKED PUMPS

The exclusive design of the Fluid Packed Pump —in which the fluid being pumped acts as a permanent packing—has been proven on thousands of installations all over the world. Types and sizes are available to meet your needs.

THE POSITIVE PULL TYPE. This pump goes in and comes out with the rods. It is recommended for wells of all depths and for fluids of any gravity or viscosity.

THE REMOVABLE TYPE. The operator can either pull the standing valve and standing tube when pulling the traveling tube assembly, or leave them in place.

THE MARGINAL TYPE. A low priced Fluid Packed Pump designed to reduce the cost of pumping marginal and small production wells with troublesome sand conditions.

IMPROVED INSERT PUMPS

The quality pump of solid, one-piece barrel construction. Extra wall thickness assures unusually long life and permits several re-honing jobs. Available in all popular sizes and lengths.

FLU-RING and FLU-CUP PUMPS

These pumps are low in cost and will give highly efficient production under the less severe conditions.

Fluid Packed Pump Catalog No. 9—sent on request—contains descriptions, illustrations and ordering data covering the complete line of Flupaco Pumps for every production need. Write for your copy of this valuable catalog TODAY!

CINCO MANERAS DE AHORRAR GASTOS
Con las BOMBAS Flupaco

1—Ahorro en precio inicial.
2—Ahorro en gastos de conservación.
3—Ahorro en costo de fuerza motriz.
4—Ahorro en retardo
5—Ahorro en costo total por cilindro.

La adelantada técnica manufacturera de la FLUPACO ahorra acero esencial y produce bombas de pozo de petróleo tan sencillas, tan durables y tan eficaces, que el costo de la extracción queda reducido a un mínimo.

"CIERRES DE RANURA" FLUPACO proveen cilindros que son de 4 a 8 veces más duraderos que los de las bombas ordinarias. Estas bombas de precio tan económico haciendo muy bien los trabajos más difíciles, en todas partes. Su mayor rendimiento y menor necesidad de reparación hacen que estas bombas de cilindro de una sola pieza cementadas y bruñidas representen hoy día lo máximo en valor intrínseco.

LA PRODUCTORA DE CANTIDAD. Recomendada para pozos de gran rendimiento y para pozos de producción y de profundidad medianas.

LA PRODUCTORA. Para pozos de producción y de profundidad medianas y para pozos de extracción a fuerza, donde el costo de las bombas y de la fuerza motriz han de mantenerse con la mayor economía posible.

La PETROL "A". Proyectada para pozos de poca profundidad y de producción relativamente pequeña, en los cuales son muy severas las condiciones de trabajo.

BOMBAS DE EMPAQUETADURA FLUIDA
El tipo exclusivo de la bomba de empaquetadura fluida—en el cual el líquido que se maneja sirve de empaquetadura permanente—ha sido demostrado en millares de instalaciones en todas partes del mundo. Hay tipos y tamaños para satisfacer cualquier requisito.

EL TIPO DE TIRO POSITIVO. Este bombea entra y sale con las varillas. Se recomienda para pozos de cualquiera profundidad y para líquidos de cualquiera densidad o viscosidad.

EL TIPO DESPRENDIBLE. El operario puede sacar la válvula y el tubo, al levantar el grupo de tubo móvil, o bien dejarlos unidos en su sitio.

EL TIPO MARGINAL. Una bomba de empaquetadura fluida de precio económico, proyectada para reducir el costo de extracción de los pozos marginales o de pequeña producción en los cuales predominan difíciles condiciones de arena.

BOMBAS DE INSERCION PERFECCIONADAS
La bomba de superior calidad, con cilindro macizo de una sola pieza. El adicional espesor de la pared asegura extraordinaria duración y permite varias rectificaciones o bruñidos. Se ofrece en todos los tamaños y longitudes populares.

BOMBAS FLU-RING Y FLU-CUP
Estas bombas son económicas en precio y aseguran eficaz rendimiento bajo las más severas condiciones de trabajo.

RECOMENDACIONES DE CONSERVACION
Cuatro sencillas maneras de prolongar la duración del existente equipo de bombeo

1. TRANSPORTE CUIDADOSO. Coloque las bombas en huacales para el transporte a larga distancia. Manéjelas con cuidado para no dobarlas. Coloque las bombas sobre superficies planas o soportes a poca distancia. No coloque ningún objeto pesado sobre las bombas. Envuelva los extremos, pero no quite las etiquetas de embarque o de información.

2. INSPECCION. Limpie la bomba lo más pronto posible después de sacada del pozo. Coloque la bomba de plano sobre un banco e inspecciónela con cuidado. Verifique el estado del asiento de anclaje de la bomba y de todas las válvulas esféricas accesibles y sus asientos. Emplee una bomba hidráulica para despojar la arena del émbolo. Emplee llaves adecuadas para quitar las piezas. Evite la aplicación de demasiada fuerza al apretar las piezas.

3. REPARACION Y MONTAJE. Remueva todas las piezas desgastadas, usando piezas nuevas de dimensiones exactas. No aplique demasiada fuerza al apretar las piezas. Limpie y lubrique las roscas o filetes, en primer lugar. Vea que todas las válvulas queden en sus respectivos puntos. Después de armada o montada, átele una etiqueta para identificar la bomba e indicar todas sus especificaciones importantes.

4. ALMACENAJE SISTEMATICO. Aceite, engrase o envuelva todas las piezas expuestas a enmohecerse. Envuelva los accesorios en papel a prueba de humedad. Guarde las bombas en un sitio en que no puedan ser estropeadas o dañadas.

El catálogo No. 9 de bombas de empaquetadura fluida —se enviará a solicitud. Contiene descripciones, ilustraciones e instrucciones para formular los pedidos. Describe todo el surtido de bombas Flupaco para todo requisito de producción. Pídanos un ejemplar de este valioso catálogo AHORA MISMO.

Conservation Tips

Four simple ways to make present pumping equipment last longer.

1. CAREFUL TRANSPORTATION. Crate pumps for long hauls; handle carefully to avoid bending. Lay pumps on flat surface or supports at close intervals. Don't pile heavy objects on pumps. Wrap ends but do not remove shipping or data tags.

2. INSPECTION. Clean the pump as quickly as possible after it comes out of the well. Lay pump flat on bench and inspect thoroughly. Check condition of pump anchor seat and all accessible ball valves and seats. Use hydraulic pump to free sanded plunger. Use wrench flats when unscrewing parts, with end-wrenches to fit. Avoid applying excessive torque.

3. REPAIR AND REASSEMBLY. Replace all worn parts with new ones, working with wrenches close to mating surfaces. Do not make up parts with excessive pressure—clean and lubricate threads first. Be sure all valves are in proper position. When reassembled, tag and identify pump, giving all important specifications.

4. SYSTEMATIC STORAGE. Oil, grease or wrap all parts subject to rust. Wrap accessories in moisture-proof paper. Store so that pumps cannot be damaged.

FLUID PACKED PUMP COMPANY

BOX 64, LOS NIETOS
CALIFORNIA, U. S. A.

Bldg., Tulsa, Oklahoma; 6006 Navigation Bldg., Houston Texas; Texas Bank Bldg., Dallas, Texas; National Supply Co. Stores, Illinois Fields

WORLD'S LARGEST EXCLUSIVE OIL WELL PUMP MANUFACTURERS

Francitas PREFERS G-MV

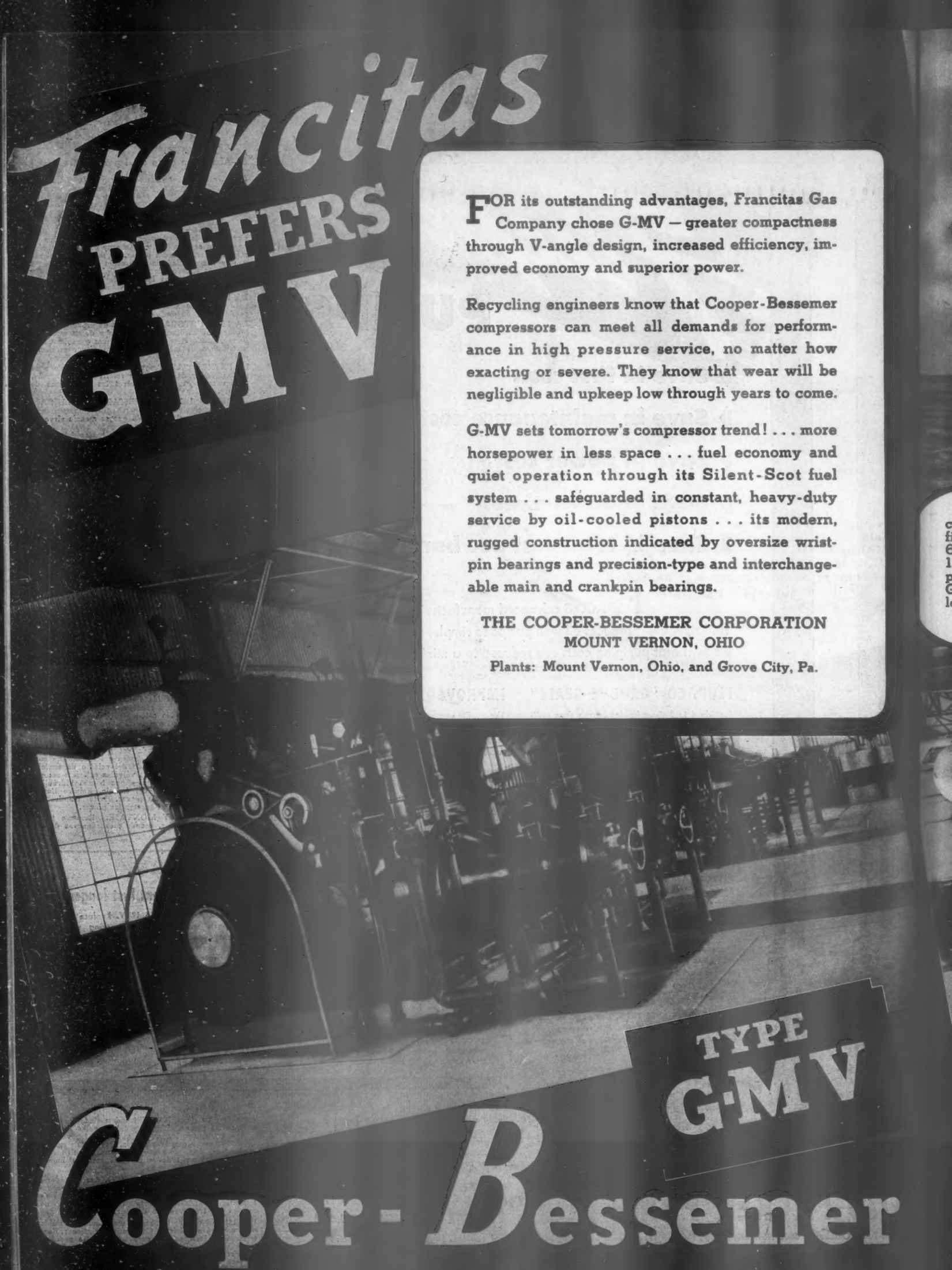
FOR its outstanding advantages, Francitas Gas Company chose G-MV — greater compactness through V-angle design, increased efficiency, improved economy and superior power.

Recycling engineers know that Cooper-Bessemer compressors can meet all demands for performance in high pressure service, no matter how exacting or severe. They know that wear will be negligible and upkeep low through years to come.

G-MV sets tomorrow's compressor trend! . . . more horsepower in less space . . . fuel economy and quiet operation through its Silent-Scot fuel system . . . safeguarded in constant, heavy-duty service by oil-cooled pistons . . . its modern, rugged construction indicated by oversize wrist-pin bearings and precision-type and interchangeable main and crankpin bearings.

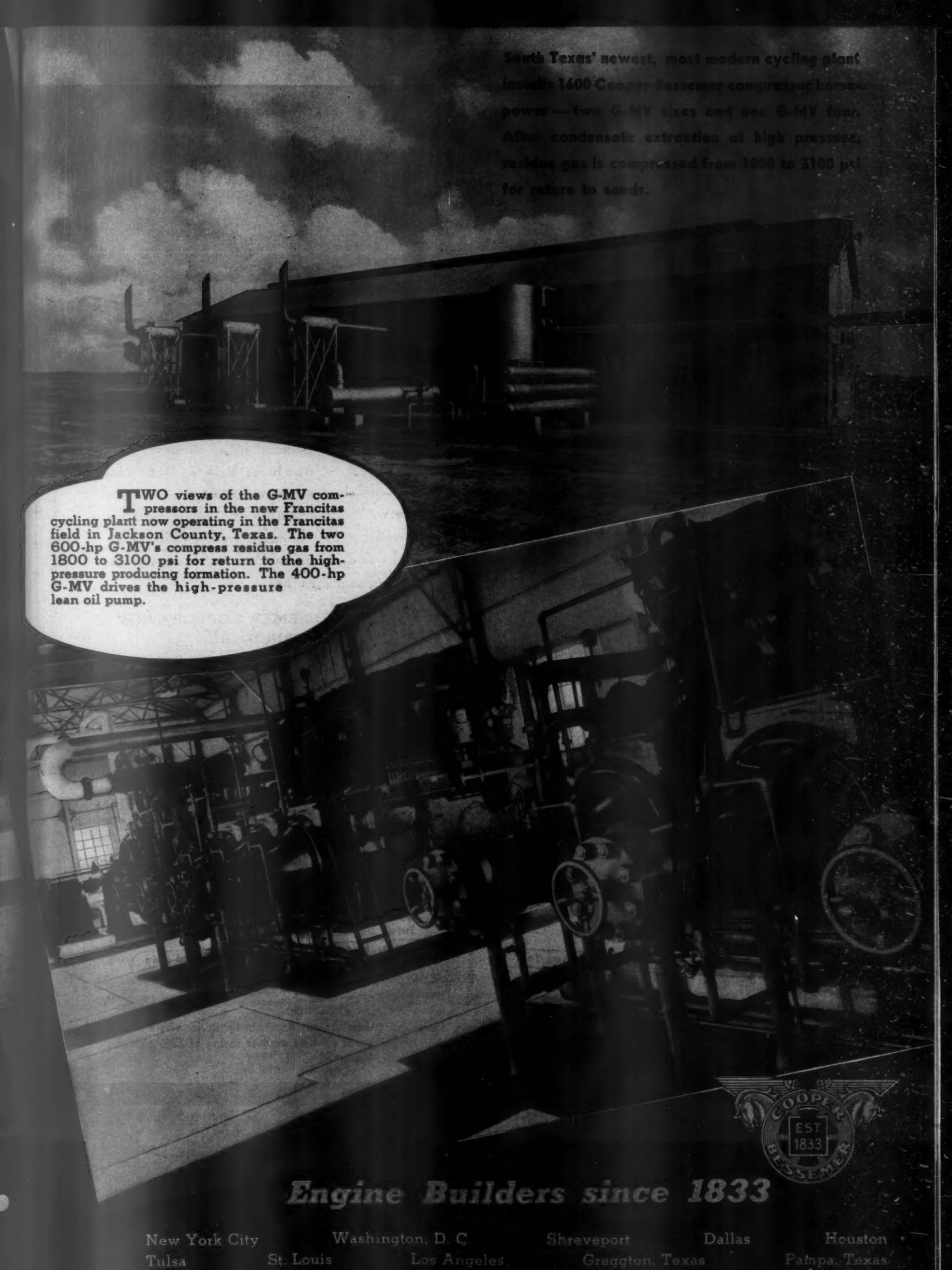
THE COOPER-BESSEMER CORPORATION
MOUNT VERNON, OHIO

Plants: Mount Vernon, Ohio, and Grove City, Pa.



TYPE G-MV

Cooper-Bessemer



South Texas' newest, most modern cycling plant installs 1600 Cooper-Bessemer compressor horsepower—two G-MV sixes and one G-MV four. After condensate extraction at high pressure, residue gas is compressed from 1800 to 3100 psi for return to sands.

TWO views of the G-MV compressors in the new Francitas cycling plant now operating in the Francitas field in Jackson County, Texas. The two 600-hp G-MV's compress residue gas from 1800 to 3100 psi for return to the high-pressure producing formation. The 400-hp G-MV drives the high-pressure lean oil pump.

COOPER BESSEMER EST 1833

Engine Builders since 1833

New York City Washington, D. C. Shreveport Dallas Houston
Tulsa St. Louis Los Angeles Greggton, Texas Pampa, Texas

WILDCATS CAN BE DRILLED FOR 25% LESS TODAY!

From the Files of a Major Operator:

THE OLD METHOD

WELL "A"

Location: South Louisiana
Date Drilled: 1941
Total Depth: 9000'
Cores: Conventional; every other ten feet.
Drilling Cost: $105,000.00

THE MODERN METHOD

WELL "B"

Location: South Louisiana
Date Drilled: 1941
Total Depth: 9800'
Cores: None—Electrically logged and side wall sampled by Schlumberger
Drilling Cost: $65,000.00

The above comparison of drilling costs reflects a high percentage of saving due to the very favorable conditions encountered in South Louisiana where oil may be found from "grass roots" to any depth. In territories where more definite objectives exist an average saving of 25% should prove conservative.

SCHLUMBERGER

Originators of Electrical Well Logging

BUDA ESTABLISHED 1881

Oil Field Engines

MOTORES para la INDUSTRIA PETROLERA

•

THRIFTY POWER *you can always* DEPEND ON!

RUGGED POWER FOR DRILL RIGS

THRIFTY POWER FOR PIPE LINE PUMPING

DEPENDABLE POWER FOR PRODUCTION PUMPING

BUDA Oilfield Engines have established outstanding records for all-around low-cost performance that *lasts*. On drill rigs, in production and pipeline pumping, these rugged engines deliver thousands of hours of trouble-free service with minimum maintenance . . . a reliable source of power that costs you less for fuel, servicing and repairs. BUDA'S complete line includes Diesel, gasoline, butane and natural gas engines from 15 to 250 h.p.

For complete information, see the BUDA representative in your country or write directly to:

•

Los motores Buda para la Industria del Petróleo han establecido una reputación envidiable por su rendimiento y economía. Fuerza abundante para equipos de perforación rotatoria, bombeo de extracción y oleoductos.

Motores Diésel, de gasolina, gas natural desde 20 hasta 250 CF.

Véase al Representante Buda en ese país.

BUDA

THE BUDA COMPANY

HARVEY (CHICAGO SUBURB) ILLINOIS

Las Prácticas y Seguras Herramientas Petrolíferas "Baker"

Producto No. 500
Ensanchador Rotario "Baker"

ENSANCHADOR ROTARIO "BAKER"
(PRODUCTO NO. 500)

USO:

Sirve para ensanchar las paredes del pozo a un diámetro considerablemente mayor que el de la cañería por la cual se haya bajado esta herramienta. El ensanchamiento puede verificarse en cualquier punto deseado en el pozo. El Ensanchador "Baker" puede convertirse en un Saca-testigos de Pared mediante la substitución de las aletas ensanchadoras por otras especiales, saca-testigos.

APLICACIONES

Terminación y limpieza de pozos—Colocación de Cañerías Perdidas—Colocación de Filtros de Pedregullo (Cascajo)—Asientos para Cementación—Remoción de Secciones de Cañería Perforable—Ensanchamiento en el Punto de Cementación—Colocación de Tapones de Cemento—Pruebas del Aislamiento de Agua.

CARACTERÍSTICAS SOBRESALIENTES:

SENCILLEZ DE USO Y OPERACIÓN

La herramienta es muy fácil para operar. Se construye de un mínimo numero de partes esenciales, y cualquier perforador experimentado puede operarla sin dificultad y con la seguridad de obtener resultados satisfactorios.

GRAN RESISTENCIA Y SEGURIDAD

El cuerpo del Ensanchador se fabrica de una sola pieza sólida de acero aleado; las Aletas se fabrican de una aleación especial de acero forjado que da por resultado una herramienta de gran resistencia. La Característica de seguridad del Ensanchador "Baker" consiste en que las Aletas se cierran siempre dentro del Cuerpo al retirar la herramienta del pozo. Por lo que sabemos, ningún Ensanchador "Baker" ha dejado de funcionar con eficiencia y seguridad en la operación completa al salir del pozo, quedando el hueco en buena condición para las operaciones subsiguientes.

ASOMBROSA CAPACIDAD DE ENSANCHAR

La herramienta se ha diseñado cuidadosamente para proveer una resistencia tremenda y una gran capacidad de ensanchar la parte inferior del pozo a un diámetro mayor que el de la parte superior, aunque dicha herramienta tiene dimensiones periféricas mínimas relativamente pequeñas. Por ejemplo, un Ensanchador No. 6 puede bajarse por cañería de entubación de 9⅝" A.P.I. y entonces ensanchar desde un mínimo de 9¼" hasta un máximo de 19", dependiendo del calibre de las Aletas que se usan.

OPERACIÓN EFICIENTE

Las siguientes características de construcción aseguran la operación eficiente del Ensanchador "Baker":

(*a*) La larga superficie cavadora de las Aletas contra la formación ayuda a evitar que la herramienta dé vuelta en un movimiento espiral ("corkscrew") y asegura el ensanchamiento del hueco a su máximo diámetro.
(*b*) La superficie cortante de las Aletas del Ensanchador ha sido endurecida con inserciones de carburo de tungsteno lo cual se traduce en una máxima duración de corte.
(*c*) El trépano piloto se proyecta en el pozo de menor diámetro delante del Ensanchador, ayudando a centralizar la herramienta y afirmando la acción cortante.
(*d*) Los flúidos circulantes son dirigidos sobre las Aletas, lubricando y limpiando las superficies cortantes.
(*e*) El colodar de circulación se ha diseñado para resistir la acción abrasiva de flúidos cargados de arena y impide que los desechos atasquen los pasajes de circulación.
(*f*) El tipo de cabeza de émbolo eficaz con empaquetaduras resistentes a petróleo asegura una abertura positiva de las Aletas.
(*g*) El fuerte resorte del émbolo cierra la Aleta dentro del Cuerpo cuando la operación ha sido terminada.

CENTRALIZADOR DE CAÑERÍA DE ENTUBACIÓN "BAKER" MODELO TIPO "B"
(Producto No. 910)

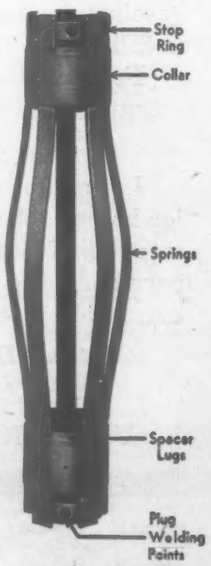
USO:

Sirve para centralizar efectivamente en el pozo la cañería de entubación proveyendo un espacio uniforme entre las paredes del pozo y la cañería de entubación. Este último ofrece la mejor oportunidad para entubar bien la cañería en los puntos de cementación con un buen anillo uniforme de cemento, reduciendo al mínimo el riesgo de canalización.

CARACTERÍSTICAS SOBRESALIENTES:

La unidad se construye sencillamente pero es suficientemente fuerte. Los resortes son del tamaño 3/16" x 1½" y se hacen de acero de resorte tratado térmicamente.

La unidad emplea un tipo de principio operativo particularmente eficiente. Sea que el Centralizador se levante o se baje más allá de restricciones en el hueco, la unidad es siempre elevada o bajada medio los anillos de detención a los extremos de los resortes. Esta acción elevadora o bajadora en lugar de empuje, evita cualquier posibilidad de dañar los resortes o perjudicar su eficiencia para centralizar la cañería cuando dicha cañería se está colocando.



Producto No. 910
Centralizador de Cañería de Entubación

Para detalles más completos sobre el equipo ya mencionado, véase las páginas 227 á 298 del Catálogo "Baker" o el Catálogo Compuesto ("Composite Catalog") de 1912.

GEOPHYSICAL SERVICE INC.
1311 REPUBLIC BANK BUILDING
DALLAS, TEXAS

EUGENE McDERMOTT
PRESIDENT
H. B. PEACOCK
VICE PRESIDENT
CECIL H. GREEN
VICE PRESIDENT
J. E. JONSSON
SECRETARY

December 31, 1942

To our good friends everywhere:

In many a far corner of the world today, former associates, old friends, one-time G.S.I. employees are fighting for the United Nations. On the last day of the year G.S.I. takes time out to salute them and wish them well.

We look forward to having them with us soon again, to returning together to our peace-time pursuits.

In the meantime, we pledge ourselves to do our full share to produce the war goods they need, to find the oil reserves they must have, to sustain their endeavors.

Sincerely yours,

Geophysical Service, Inc.

Eugene McDermott
Pres.

EMcD/J

FOR YOUR
EXPLORATION PROBLEMS
Call in **G.S.I.**

GEOPHYSICAL SERVICE INC.

DALLAS, TEXAS

7 good reasons

Bowen Casing Cutter—Lathe-precision cuts without chattering or crawling make this tool ideal for all cut and pull jobs on drill pipe, casing or tubing. No tricky or dangerous operations required. Positive action permits multiple cuts to be made without removing tool.

Bowen Releasing Overshot—Easy to use—catches drill pipe, coupling or tool joint without changing slips or adjusting. Spiral grapple cinches tighter as pull increases and gives a full-length positive grip. Sets and releases *to the right*, instantly and safely.

Bowen Releasing Socket—A sturdy outside fishing tool for any job such as twist-offs where a positive, rugged hold is required, and long hours of hard jarring are necessary. Releases with same non-failing action as Bowen Spear. Pack-off provided if desired.

Bowen Junk Basket—Deflection of fluid from hole wall to center of tool coupled with reverse circulation, washes all junk *into* the basket instead of forcing it away. *Uses full pump pressure.* A real tool for hole straightening and core recovery operations, as well as for fishing.

Bowen Safety Joint—A *safe* safety joint for all drilling and fishing operations. Delivers full torque capacity of the string *in either direction*, releases only on definite mechanical actions. Simple construction—only two pieces—eliminates extra parts.

Bowen Releasing Spear—For cutting and pulling casing, drill pipe or tubing, setting liners, etc. Has only six sturdy parts, thus insuring ruggedness and trouble-free operation. Releasing mechanism has never been known to fail even under the toughest conditions.

Special Bowen Rotary Jar—*A straight pull* fishing jar that requires no torque in the drill string for operation and can strike as many as ten blows *per minute* with safety. Incorporates means for varying intensity of blow *without coming out of the hole.*

Cortatubos de yeso Bowen—El corte de precisión de un torno, sin vibración ni desplazamiento, hace que esta herramienta sea ideal para todos los trabajos de corte y remoción en tubo de perforación, tubería de revestimiento y tubería de producción. Ninguna operación complicada o peligrosa. La acción positiva permite cortes múltiples sin quitar la herramienta del agujero.

Enchufe de disparo Bowen (Overshot)—Muy fácil de usar. Agarra el tubo de perforación, acoplamiento o unión cónica de herramienta, sin cambiar las cuñas o necesitar ajustes. El miembro espiral de sujeción se pone más apretado a medida que se aumenta el peso o carga y da un agarro positivo a longitud completa. Se suelta con un golpe hacia abajo y un giro a la derecha, instantaneamente y con seguridad.

Enchufe de pesca Bowen—Una firme herramienta de pesa exterior, para cualquier trabajo, como los de torcedura, donde se requiere una sujeción firme y positiva más largas horas de trabajo de percusión bien pesado. Se suelta con la misma acción segura del arpón Bowen. Se suministra obturador, cuando se pida.

Canasta Bowen para útiles—La deflexión del líquido de la pared del agujero al centro de la herramienta, acompañada por circulación invertida, introduce todos los útiles en la canasta, en lugar de alejarlos de ella. *Aprovecha toda la presión* de la bomba. Una verdadera herramienta para enderezar agujeros y recuperar núcleos, sirviendo también para trabajos de salvamento.

Unión de seguridad Bowen—Una unión de completa seguridad para todos los trabajos de perforación y salvamento. Suministra toda la fuerza de rotación de la cadena en *cualquiera dirección* y se suelta sólo bajo determinadas acciones mecánicas. Construcción muy sencilla—sólo dos piezas—sin ningunas adicionales.

Arpón de disparo Bowen—Para cortar y sacar tubería de revestimiento, tubo de perforación o tubería de producción, instalar tubería de revestimiento, etc. Tiene sólo seis piezas muy firmes, lo que asegura facilidad de manejo. El mecanismo de disparo jamás ha dejado de funcionar bien, aun sujeto a las condiciones más adversas.

Percusor giratorio Bowen, tipo especial—Un percusor de salvamento *de tiro recto*, que no requiere esfuerzo de rotación en la cadena de tubería para su funcionamiento y que puede dar hasta diez golpes *por minuto* con toda seguridad. Comprende un dispositivo para graduar la intensidad del golpe, *sin sacarlo del agujero.*

Bowen Fishing Tools are available throughout major oil territories on an economical rental basis, and are sold for export use only. Why not get acquainted with the complete Bowen line now by writing for your copy of the latest Bowen Catalog or referring to your 1942 Composite Catalog. ***Do it today!***

SR BOWEN CO

BOWEN FISHING TOOL COMPANY

MAIN OFFICE ★ SANTA FE SPRINGS CALIFORNIA

BRANCHES AT HUNTINGTON BEACH
VENTURA ★ BAKERSFIELD ★ AVENAL
AND SANTA MARIA, CALIFORNIA
CASPER, WYOMING

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EXPORT OFFICE ★ 30 ROCKEFELLER PLAZA
NEW YORK CITY, NEW YORK

Baash-Ross News

BAASH-ROSS TOOL COMPANY • LOS ANGELES • HOUSTON • NEW YORK

OIL & GAS JOURNAL EDITION

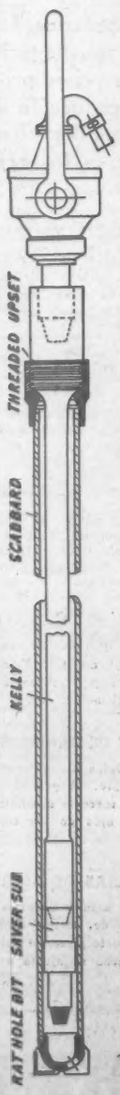
4 VALUABLE TIPS!

For Prolonging the Life and Maintaining the Straightness of Your BAASH-ROSS KELLY!

Your kelly represents a sizeable investment in top-grade, hard-to-get alloy steel. Protect it against damage and abuse by following these simple steps when hauling, racking and using it. They will help lengthen kelly life and enable you to get more value, more service from your kelly investment...

1ST MAKE SURE YOU HAVE A SCABBARD FOR EACH KELLY

A Scabbard is easily made from a section of extra heavy casing, just large enough to accommodate the kelly. At left is suggested arrangement of a unique double-duty scabbard. Kelly upset is threaded to hold the scabbard in place while transporting and storing. Wing blades welded to bottom permit drilling a rat-hole with scabbard and kelly assembled... then scabbard is used for casing the rat-hole. While kelly is in service, the special adapter (see below) is placed at top of scabbard to support bushing and protect threads when kelly is lowered into rat-hole. When moving to a new location, kelly is simply screwed into scabbard and whole assembly is moved as a unit.



Left: Special adapter connects to Scabbard for supporting kelly bushing and protecting scabbard threads when kelly is lower...

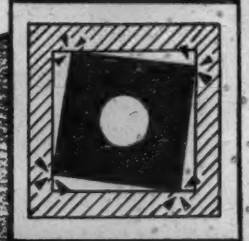
2ND ALWAYS KEEP KELLY IN SCABBARD WHEN NOT IN ACTUAL SERVICE

Leave kelly in scabbard until assembly is hanging vertically in rig. Then unscrew scabbard and support it in table while removing kelly for use. Conversely, insert kelly vertically into scabbard BEFORE laying assembly down on walk. Probably more kellys are bent by laying them down or picking them up from cat-walk without protection of scabbard than in any other way... and a bent kelly is practically useless for modern drilling operations. And never drop a kelly into or pull it out of the rat-hole too fast. Dropping the kelly on bottom of rat-hole can easily kink it... and pulling it out too fast will cause severe bending strains. Also, be sure to dig your rat-hole deep enough to accommodate the kelly without excessive "overhang" of swivel. Weight of swivel, unless closely supported, can cause bending.

3RD KEEP KELLY BUSHING TIGHT

A sloppy kelly bushing means that driving forces are concentrated at the kelly corners... causing excessive wear at these points and tending to round off the kelly. But with proper fit, driving pressure of kelly bushing is evenly distributed over a greater area, insuring longer life and increased operating efficiency. This precaution is important on all types of kellys and is particularly vital on hexagonal kellys. But if you are using a Baash-Ross Roller Kelly Bushing with your hex kelly, you will find it easy to maintain proper adjustment by simply removing shims to take up extra play—a valuable construction feature.

Correct fit distributes driving pressures.



Sloppy fit concentrates pressures at corners.

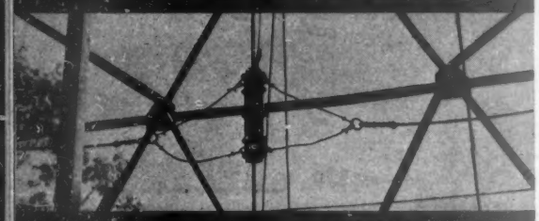
4TH USE SAVER SUB TO TAKE THREAD WEAR

Too many operators still make and break connections at the kelly thread. Install a "saver sub" between kelly and drill string, then make and break connections at this sub, saving thread wear on kelly. It's always easier—and *safer*—to send the sub into a shop for re-threading than to send in the kelly... and you won't lose the use of the kelly if you keep a standby sub at hand to substitute while the other is being re-threaded.

BAASH-ROSS TOOL CO.

LOS ANGELES • CALIFORNIA

PATTERSON-BALLAGH PROTECTORS SAVE PIPE



PATTERSON-BALLAGH WIRE LINE GUIDE ADDS LINE LIFE

PATTERSON-BALLAGH PIPE WIPER STRIPS PIPE

CENTRAL BAY OF PATTERSON-BALLAGH PRESS DEPT.

PATTERSON-BALLAGH PLANT, LOS ANGELES

PATTERSON-BALLAGH OIL FIELD *Specialties*

"Best Bet Yet"

Cada producto de Patterson-Ballagh ha sido probado en la práctica. Los protectores Patterson-Ballagh llevan ya catorce años de servicio satisfactorio y se usan en la mayor parte de las instalaciones de perforación de pozos profundos en todas las Américas. El constante perfeccionamiento de la producción de caucho para servicio en campos petrolíferos ha resultado en máxima duración. Si es un producto de Patterson-Ballagh, puede estar seguro de que es lo *mejor del ramo*.

PROTECTORES DE LABIO

1. El más reciente desarrollo en protectores enteramente de caucho. Un perfeccionamiento exclusivo de Patterson-Ballagh. Los labios gruesos agregados arriba y abajo imparten completa forma perfilada; evitan que el tubo de perforación sufra daños. De todos los tamaños.

ESTABILIZADORES

2. Para perforación de agujero a descubierto. Estabiliza el tubo. Reduce la vibración del tubo. Impide el desgaste excesivo de la unión para herriamientas. De caucho especialmente tratado y completamente uniforme.

PROTECTOR DE TUBERIA

3. Evita efectivamente el desgaste destructivo del collar. Ajusta sobre el collar o en el recalco de la tubería. Se hace de material plástico especial de gran resistencia al petróleo.

PROTECTORES DE VARILLA DE BOMBA

4. Evitan que las varillas y los acoplamientos se desgasten por el roce con la tubería. El tipo de varilla se instala lateralmente en la varilla.

PISTOLA DE LODO DE SEGURIDAD

5. Un dispositivo muy efectivo para agitar y mezclar el lodo en el foso. Se mueve en cualquiera dirección y puede cerrarse en cualquier posición. Un hombre solo la maneja. Empaquetadura especial de duración ilimitada. Boquilla de caucho muy durable.

PISTOLA DE LODO SUPER UNIVERSAL

6. El más reciente tipo. De acero fundido, con doble paso compensado, para trabajo en que el lodo se inyecta sobre una base de 24 horas. Se cierra en cualquier posición. Puede equiparse con meltiple de 4 vias.

LIMPIADOR DE TUBO Y TUBERIA

7. Disco de caucho de una sola pieza, reforzado, de trabajo pesado. Se loca debajo de la plataforma. Limpia muy bien el tubo y la tubería. Evita que las herramientas caigan en el agujero. Ahorra agua de lavar. Tamaños de 9 a 19".

LIMPIADORES DE KELLY

8. Disco de caucho que limpia al kelly de todo el lodo. Se ofrece con aberturas rectangulares, hexagonales u octagonales. Se inserta dentro del bujo del kelly. Accesorios o guarniciones especiales.

LIMPIADORES DE VARILLA DE BOMBA

9. Se ofrecen en dos tipos: normal y universal. Ilustramos aquí este último. Caja compacta. El tipo de arriba está equipado con caja de doble cierre. Dos discos de completa flotación limpian efectivamente la varilla de bomba.

LIMPIADORES DE CABLES DE ALAMBRE

10. Dos estilos—estilo A y estilo B. Ilustramos aquí este último. La caja de acero del tipo B contiene el bloque de caucho y se sujeta por grapas de resorte. La pieza de acero fundido está abisagrada.

GUIAS DE CABLES DE ALAMBRE

11. Se usan en todos los trabajos de perforación. Dan protección a los cables de alambre. A prueba de chispas. Evitan la vibración. Aseguran correcto arrollamiento. No hay astillas que salten a los ojos de los trabajadores. Se ofrecen en varios tamaños.

AMORTIGUADORES DE ASAS DE ACHICADOR

12. Evitan el desgaste de las asas y soportes del evevador. Eliminan el contacto de metal contra metal entre las articulaciones y el soporte giratorio del elevador. El bloque amortiguador de caucho se ajusta a todo tipo de soporte giratorio.

See Composite Catalog

PATTERSON-BALLAGH
Corporation

Plant: 1900 E. 65th St., Los Angeles, Cal. *New York Export Office:* 92 Liberty St. *Mid-Continent Office:* 1506 Maury St., Houston, Texas.

"SPECIFY Varec" APPROVED TANK EQUIPMENT

THE PACE SETTER SINCE 1928
LA NORMA DESDE 1928

"ESPECIFIQUE Varec" APROBADO DE TANQUE EL EQUIPO

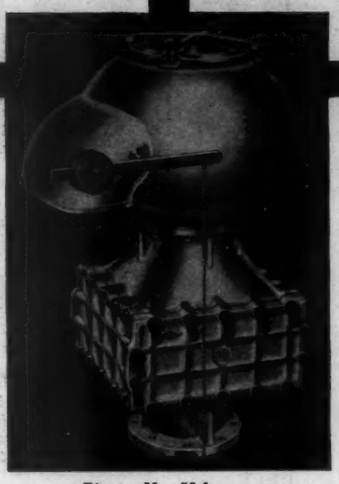


Figure No. 58A

CONSERVATION VENT UNIT FOR TANKS

Pressure & Vacuum Relief Valve with Hyperbolic Pallets, & Flame Arrester with extensible bank. Greater flow capacity. All aluminum. Non-corrosive. Inside Flame Snuffer. Fully listed by the Underwriters' Laboratories. Sizes 2" to 10".

UNIDAD DE RESPIRACION PARA CONSERVACION DE TANQUES

Válvula de desahogo de presión y vacío con paletas hiperbólicas y detenedor de llama con banco extensible. Mayor capacidad de corriente. Toda de aluminio. No puede corroerse. Apagador de llama interior. Completamente aprobado por los laboratorios de compañías de seguro. Tamaños de 2 a 10".

Figure No. 40

GAUGE AND THIEF HOLE COVER

Aluminum. Noncorrosive. Gastight. Self-closing Non-sparking. Also Pressure Types. Sizes 4" to 10".

INDICADOR Y TAPA DE PROBADOR DE MUESTRA

De aluminio. No puede corroerse. Hermético al gas. Cierre automático. No produce chispa. También tipos de presión. Tamaños de 4 a 10".

Figure No. 220

MANHOLE COVER

Semisteel cover, steel cross beam, sparkproof bushings & seating contacts. Gastight. Riveting, Bolting or Welding. Sizes 18" and 20".

CUBIERTA DE PASO DE HOMBRE

Cubierta o tapa de semiacero, con viga transversal de acero, bujes y contactos de asiento a prueba de chispa. Hermética al gas. Remachada, asegurada por pernos o soldada. Tamaños de 18 y 20".

Figure No. 90

SWING JOINT

Progressively expanding passageways, Streamline flow capacity. Tongue and grooved joint. Cast iron. Flanged or screwed. Cannot leak. Sizes 2" to 10".

UNION GIRATORIA

Conductos de extensión progressiva. Capacidad máxima de corriente de paso. Unión ranura y lengueta. De hierro fundido. Con reborde o rosca. No produce escape. Tamaños de 2 a 10".

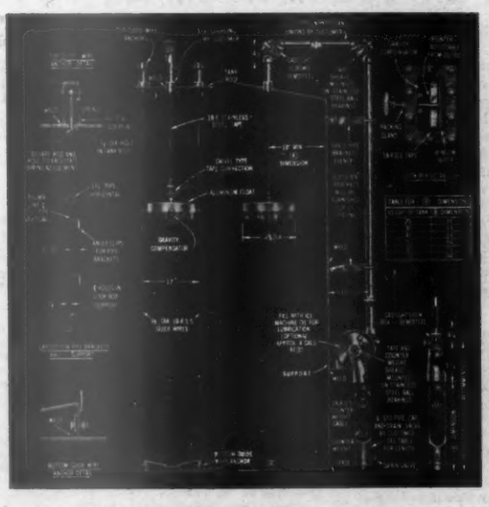


Figure No. 253

GASTIGHT AUTOMATIC TANK GAUGE

Adaptable to *any type* or size of tank by proper fittings. Available for any working pressure. Accurate to 1/16 in. Gravity Compensator adjusts for changes in gravity when fluid is changed. Sparkproof, noncorrosive, inexpensive.

MANOMETRO AUTOMATICO DE TANQUE HERMETICO AL GAS

Se adapta a cualquier tipo o tamaño de tanque mediante correctas conexiones. Se ofrece para cualquiera presión de trabajo. Exacto hasta 1/16". El compensador de gravedad se ajusta a los cambios de peso especificio cuando se cambia el líquido. A prueba de chispa no se corroe. De precio económico.

SWING LINE NOZZLE

Bolting, Riveting, or Welding to tank shell. Flanged for outside piping and studded inside to receive flanged Swing Joint. Screwed connections as required. Any series flanges as specified. Sizes 3" to 10".

BOQUILLA DE LINEA GIRATORIA

De conexión por pernos, remaches o soldadura al casco del tanque. Con reborde para tubería exterior y ranurada por dentro para admitir unión giratoria con reborde. Conexiones de tornillo, como se pidan. Cualquier tamaño de reborde que se especifique. Tamaños de 3 a 10".

Figure No. 304

GASTIGHT GAUGING AND SAMPLING UNIT

Accurate gauges, temperatures, and spot of running samples. Cast aluminum Portable Head, semi-steel Body, and Plug Gate Valve. All 18-8 stainless steel and bronze trim. Pressure 50-lbs. Sizes 2" and 4". Thermometer and Sampling Bomb optional.

UNIDAD DE INDICADOR Y PROBADOR DE MUESTRA HERMETICA AL GAS

Indica exactamente las temperaturas y prueba muestras fijas o corrientes. Cabeza portátil de aluminio fundido, cuerpo de semiacero y válvula de compuerta de tapón. Acero inoxidable de 18-8 y guarniciones de bronze. Presión de 50 libras. Tamaños de 2 a 4". Termómetro y dispotivo de muestra a elección.

Figure No. 410

SAFETY TANK WINCH

Rated capacities 1500-lbs., 2500-lbs., 5000-lbs., with only 50-lbs. handle load. Designed for 100% overload. Timken Thrust Bearings. Bronze Bushings. Worm gear construction. Positive lock.

MALACATE DE TANQUE DE SEGURIDAD

Capacidades nominales de 1500, 2500, 5000 libras, con sólo 50 libras de carga de mango. Construido para una sobrecarga de 100%. Cojinetes de empuje Timken. Bujes de bronce. Construcción de engranaje de tornillo sin fin. Cierre positivo.

Figure No. 157

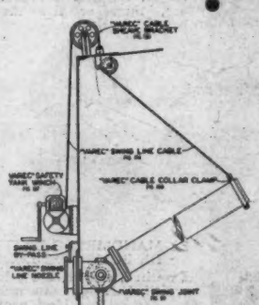
CABLE SHEAVE BRACKET

For all types of tank roofs, with or without lubricated packing gland to fit any size cable; with or without demountable top. Available for Welding, Riveting or Bolting.

SOSTEN DE ROLDANA DE CABLE

Para todo tipo de techo de tanque, con o sin prensaestopa lubricado, para adaptarse a cualquier cable; con o sin tope desmontable. Unión por soldadura, remache o perno.

Figure No. 135


"VAREC" CABLE SHEAVE BRACKET NO. 135
"VAREC" SWING LINE CABLE
"VAREC" CABLE COLLAR CLAMP
"VAREC" SAFETY TANK WINCH NO. 157
SWING LINE BY-PASS
"VAREC" SWING LINE NOZZLE
"VAREC" SWING JOINT NO. 58

SWING LINE ASSEMBLY

Installation diagram of fittings shown in this column. Ask for Drawing C-S-19 to see "pull-up" with "pull-down" assembly.

GRUPO DE LINEA GIRATORIA

En esta columna mostramos diagrama de instalación de las conexiones. Pida plano C-S-19 para ver el grupo de subida y de bajada.

Figure No. 501

"VAREC" Approved ANTI - FREEZE DRAW-OFF VALVE

This valve will not freeze at the seat and can be locked in either open or closed position. Made entirely of bronze, it is highly resistant to most corrosive agents. Available in 2" and 3" sizes, with or without oil control port.

LA VALVULA "VAREC" a prueba de atascamiento

Esta válvula no puede trabarse en su asiento y puede fijarse en posición abierta o cerrada. Se hace enteramente de bronce y es muy resistente a casi todos los agentes corrosivos. Se ofrece en tamaños de 2" y de 3", con orificio regulador de petróleo o sin él.

THE VAPOR RECOVERY SYSTEMS CO. · COMPTON, CALIFORNIA, U. S. A.

Branch Offices: New York City, Tulsa, Okla., Houston, Texas. Agencies Everywhere. · *Oficinas sucursales:* Nueva York, Tulsa, Okla., Houston, Texas. Agencias en todas partes.

This "DRILLOGGER" WILL BE YOUR BEST POST-WAR BUY FOR DRILLING CONTROL

Right now—in the midst of material shortages and other war problems—Martin-Decker can't deliver this "Drillogger". Much as we'd like to ship it, you'll just have to wait . . .

But when this war is won, we'll have the "Drillogger" available—an instrument that makes drilling control far more positive, far more effective than ever. As one oil man puts it, "The Drillogger makes all drillers equally efficient!"

GIVES VISUAL FOOTAGE LOG—The "Drillogger" is a unit that does far *more* than indicate weight, speed, mud pressure and torque. It does all these things accurately, completely . . . but *in addition* provides your driller with a *visual log*—charted right before him—that enables him to see results of adjustments he makes to drill fast, economical hole. On a five-pen recorder it instantly charts information indicated on the gauges, *plus rate of bit penetration*. Thus your driller cannot only *control* drilling functions, but when he deliberately makes changes he can see the results in penetration rate as traced right on the chart. In this way he can work out the combination of drilling factors best able to take him through any formation in record time, with greater efficiency. *And you know what that can mean in time saved . . . in equipment saved . . . in better all-around wells!*

Until we can deliver your "Drillogger" use your present Martin-Decker instruments "for all they're worth". They are all designed and built for years of sustained service . . . and they'll help you keep wear on vital equipment *down*, keep drilling efficiency *high!*

SUMINISTRA UN RESGISTRO VISUAL DE PENETRACION DE PERFORACION—El "Drillogger" es un instrumento que hace mucho *más* que indicar el peso, la velocidad, la presión del lodo y el esfuerzo de rotación. Hace todas estas cosas con exactitud y de una manera completa . . . además de proveer al perforador un registro visual bien coordinado, que le permite ver los resultados de los ajustes que hace para perforar el agujero con rapidez y economía. En un gráfico de cinco plumas, el instrumento registra instantaneamente la información acusada por los indicadores separados, añadiendo a todo esto, *la rapidez de la penetración de la barrena*. Por esta razón, el perforador no solo regula las funciones de la perforación, sino que puede, a voluntad, hacer cambios y ver en seguida los resultados que producen en rapidez o régimen de perforación, todo claramente registrado en el gráfico ante sus ojos. De este modo, puede coordinar los factores de perforación que mejor se adapten al paso por cualquiera formación en tiempo mínimo y con mayor rendimiento. *Y Vd. sabe muy bien lo que esto significa en tiempo ahorrado . . . en equipo ahorrado . . . y en pozos mejores en todo sentido.*

Hasta que podamos entregarle su "Drillogger", saque el mayor provecho posible de sus presentes instrumentos Martin-Decker. Están proyectados y construidos para dar muchos años de continuo servicio . . . y le ayudarán a *reducir el desgaste* de su equipo esencial y *conservar alto* el rendimiento de la perforación.

MARTIN-DECKER CONTROL INSTRUMENTS FOR BIG JOBS...OR SMALL

THE "SEALTITE"—The master control instrument for every job where you want *full* drilling information. Indicates and records weight, mud pressure, torque, and shows rotary table speed. Completely closed and sealed fluid system. Entirely self-contained and easier to install. Illuminated for easy night reading. Has capacity to handle 20,000 foot wells. Gauge readings are smooth, sensitive—always accurate. Available with metric dials if desired.

THE SPECIAL—A heavy-duty, direct reading weight indicator for installation on the deadline. Has standard super-sensitive vernier gauge for light weight operations. Rugged, yet extremely accurate. Illuminated 16" dial face gives maximum visibility, day or night.

THE CLIPPER—A portable weight indicator for ordinary drilling or production work. Has vernier gauge for extremely sensitive weight control when fishing, milling, etc. Light weight eliminates tendency to swing on the deadline in rough drilling.

THE SLIM HOLE—For shallow field and core testing work not exceeding weights of 150,000 pounds with six lines. Built-in diaphragm unit gives extreme compactness and high portability. Use of full dial circumference for numerals insures complete legibility from driller's position. No shims required for attaching instrument to different sized lines.

El "SEALTITE"—El principal instrumento de gobierno para todo trabajo en que se necesite *completa* información de perforación. Indica y registra el peso, presión de lodo, esfuerzo de rotación y muestra la velocidad de la plataforma o plato de la rotativa. Sistema fluído completamente tapado y sellado. Completo en todo sentido y muy fácil de instalar. Con iluminación para facilitar su lectura en la noche. Tiene capacidad para manejar pozos de 20,000 pies. Las acusaciones de los instrumentos son expeditas, sensitivas y siempre exactas. Se ofrece con caudrante en sistema métrico.

El "SPECIAL"—Es un indicador de peso de lectura directa, de trabajo pesado, para instalación en el cable de alambre para achicar. Tiene un vernier normal supersensitivo para registrar los trabajos de pesos livianos. Bien firme y extremadamente preciso. Su cuadrante de 16" iluminado es bien visible de día y noche.

El "CLIPPER"—Un indicador portátil de peso para trabajo corriente de perforación o producción. Tiene un vernir para regulación muy sensitiva de peso al tratarse de salvamento o pesca, etc. Su peso liviano suprime la tendencia a oscilación en el cable de alambre para achicar durante la perforación muy dura.

El "SLIM HOLE"—Para trabajo en pozos de poca profundidad y para sacar muestras o núcleos, con pesos que no pasen de 150.000 libras con seis cables. El diafragma integrante de máxima reducción de tamaño y gran portabilidad. El cuadrante de circunferencia completa, con números grandes, queda bien visible desde la posición del perforador. No se requieren laminitas para colocar el instrumento en cables de fiderentes tamaños.

ALL MARTIN-DECKER WEIGHT INDICATORS SHOW LOADS DIRECTLY IN POUNDS OR KILOS.

TODOS LOS INDICADORES DE PESO MARTIN-DECKER MUESTRAN LAS CARGAS DIRECTAMENTE EN LIBRAS O KILOS.

The "SEALTITE"

THE UNITIZED MUD PUMP GAUGE

Accuracy, sensitivity and smooth, easy readings make this the ideal portable gauge for measuring slush pump pressures. Mechanism runs in an oil bath, eliminating rusting or corrosion. Large numerals stand out clearly from 30 feet or more, and readings can be made by simply noting position of gauge hand. Vernier retard movement covers both low and high pressure ranges. Unitized is available in one, three or five thousand pound capacities.

EL MANOMETRO UNITIZED DE BOMBA DE LODO

Exactitud, sensitividad y lectura y fácil, hacen que este manómetro portátil sea ideal para medir las presiones de la bomba de lodo. El mecanismo funciona en baño de aceite y queda así protegido contra la corrosión o enmonhecimiento. Los números grandes se ven claramente a una distancia de 30 piés o más, ye se obtiene la lectura o acusación observando sencillamente la posición de la aguja o manecilla del manómetro. Un vernier facilita la mayor exactitud en las escalas de bajos y altas presiones. El manómetro Unitized se ofrece en modelos para indicar capacidades de 1000, 3000 y 5000 libras.

HOME OF THE WEIGHT INDICATOR

MARTIN DECKER CORP.

LONG BEACH, CALIFORNIA

SAN JOAQUIN VALLEY: A. F. McQUISTON, BAKERSFIELD, CALIFORNIA

MID-CONTINENT DISTRIBUTOR: REED ROLLER BIT COMPANY, HOUSTON, TEXAS

TO MINIMIZE TRANSPORTATION AND DRILLING DIFFICULTIES USE BAROID PRODUCTS

BAROID is a high specific gravity mud-weighting material manufactured from barytes and used successfully in thousands of wells to control formation pressures and to prevent caving. Muds suitably weighted prevent blowouts and speed drilling operations. BAROID-weighted muds have made possible the elimination of long strings of casing. For example, 177 tons of steel were saved in a single well when careful mud control was exercised with BAROID. It is easily transported and will not deteriorate in storage.

COLOX is an iron oxide drilling mud weighting material with a high specific gravity. COLOX is used to help control gas, oil, water or formation pressures and to help prevent caving. Packed in bags, it is easy to move and store.

AQUAGEL is a specially processed colloidal clay which makes about 100 barrels of mixed mud per ton of clay or which can be added in small percentages to other mud. Due to its high yield, the resulting mud is cheaper than that made by most native clays. Since fewer sacks are required, transportation costs are less. AQUAGEL reduces the amount of water entering the formation around the hole which in turn minimizes the tendency of the formation to cave and stick the drill pipe. AQUAGEL holds cuttings in suspension when circulation is stopped. Spare sacks can be moved without loss to another location.

STABILITE, when properly used, will reduce viscosities and gel strength, will insure the release of entrained gas and cuttings and will enhance wall-building properties. It is a chemical in powdered form and is packaged in such a manner as to be easily transported and stored. It is simple to mix and add to the mud and is superior to other chemicals.

PARA RERUCIR AL MINIMO LAS DIFICULTADES DE TRANSPORTE Y PERFORACION, USE LOS PRODUCTOS BAROID

BAROID es un material de alto peso específico, para aumentar el peso del lodo, hecho de baritas y usado con mucho éxito en millares de pozos, para regular las presiones de la formación y evitar el hundimiento. Los líquidos o lodos de perforación, debidamente pesados, evitan los reventones y aceleran los trabajos de perforación. Los lodos tratados con BAROID han hecho posible la eliminación de largas cadenas de tubería. Por ejemplo, se ahorraron 177 toneladas de acero en un solo pozo cuando el lodo fué cuidadosamente regulado con BAROID. Se transporta con facilidad y no se deteriora durante su almacenaje.

COLOX es un material de óxido de hierro de alto peso específico, para aumentar el peso del lodo de perforación. COLOX se usa para ayudar a regular las presiones del gas, petróleo y agua de las formaciones. Ayuda a evitar el hundimiento. Vendido en sacos, para facilitar su transporte y almacenaje.

AQUAGEL es una greda coloidal especialmente tratada, que produce como 100 barriles de lodo mezclado por tonelada de greda, o que puede ser añadida en pequeños porcentajes, a otro lodo. Debido a su gran rendimiento, el lodo resultante es más barato que el preparado con casi cualquiera de las gredas nativas. Como se requieren menos sacos, resulta más económico el costo del transporte. AQUAGEL reduce la cantidad de agua que entra en la formación por el agujero, lo cual, a su turno, reduce la tendencia de la formación a hundirse y paralizar el tubo de perforación. AQUAGEL mantiene en suspensión los despojos cuando cesa la circulación. Los sacos restantes pueden llevarse sin pérdida alguna a otros puntos de trabajo.

STABILITE, debidamente usado, reducirá las viscosidades y resistencia gelatinosa, asegurará el escape del gas trapado y de los despojos, y acentuará las propiedades de la formación de pared estable. Es una substancia química, en polvo, que se suministra en paquetes muy fáciles de transportar y almacenar. Se mezcla con el lodo o se agrega a éste con toda facilidad, y es muy superior a otras substancias químicas.

BAROID PRODUCTS

BAROID and COLOX: Drilling Mud Weighting Materials.

AQUAGEL: Gelf-Forming Colloidal Drilling Clay.

FIBROTEX: A Fibrous Material For Restoring Lost Circulation.

BAROCO: A Salt-Water-Resisting Drilling Clay.

STABILITE: A Superior Chemical Mud Thinner.

AQUAGEL-CEMENT: Material For Recovering Lost Circulation And Cementing Casing.

SMENTOX: Material For Overcoming The Effect Of Cement-Contamination In Mud.

ZEOGEL: A Special Clay To Be Used As A Suspending Agent When High Concentrations Of Salt Or Salt Water Are Encountered.

MICATEX: A Material For Reducing Water Loss To The Formation And For Overcoming Mild Cases Of Lost Circulation.

IMPERMEX: A Concentrated Colloidal Additive Agent For Reducing Water Loss In Salt-Laden Muds.

TESTING EUIPMENT: Apparatus For Making Complete Field And Laboratory Examinations Of The Properties Of Drilling Mud.

SERVICES—DRILLING MUD ANALYSIS AND CONTROL: Baroid Service Engineers And Their Laboratory-Equipped Cars Are Available In All Active Oil Fields Of The United States. These Engineers Are Trained And Experienced In Analyzing And Correctingg Mud Troubles.

BAROID WELL LOGGING SERVICE: Formation Information Through Mud Analysis.

PRODUCTOS BAROID

BAROID y COLOX: Materiales para aumentar el peso de los lodos de perforación.

AQUAGEL: Greda coloidal de perforación formadora de gelatina.

FIBROTEX: Un material fibroso para restablecer la circulación perdida.

BAROCO: Greda de perforación resistente al agua salada.

STABILITE: Un excelente producto químico para diluir el lodo.

AQUAGEL-CEMENT: Material para recuperar la circulción perdida y cementar revestimiento.

SMENTOX: Material para contrarrestar el efecto de la contaminación del cemento en loda.

ZEOGEL: Una greda especial, que se usa como agente de suspensión cuando, se presentan grandes concentraciónes de sal o agua salada.

MICATEX: Un material para reducir la pérdida de agua, que va a la formación, y para curar los leves casos de pérdida de circulación.

IMPERMEX: Un agente coloidal concentrado, que se agrega para reducir la pérdida de agua en lodos cargados de sal.

EQUIPO DE ENSAYO: Aparatos para hacer ensayos completos en el campo y examenes de laboratorio de las propiedades del lodo de perforación.

SERVICIOS-ANALISIS Y GOBIERNO DEL LODO DE PERFORACION: Los ingenieros del Servicio Baroid y sus laboratorios instalados en automóviles, están a la disposición de los interesados en todos los campos petroliferos activos de los Estados Unidos de América. Estos ingenieros tiene el conocimiento y la experiencia práctica para analizar y corregir los probelmas de lodos de perforación.

SERVICIO BAROID DE INFORME DIARIO DE PERFORACION DE POZOS: Información sobre la formación o vacimiento mediante análisis del lodo.

BAROID SALES DIVISION

NATIONAL LEAD COMPANY

BAROID SALES OFFICES: HOUSTON • LOS ANGELES • TULSA

"SELLING GOODS THAT WON'T COME BACK —TO CUSTOMERS WHO WILL"

● *Left:* Pole trailer

● *Below* Semi trailer

Has been called Salesmanship. A better explanation would be a Good Product and Satisfied Customers. Let's emphasize this. For 25 Years Spencer has specialized in exclusive manufacture of trailers for every tpye of hauling in the oil industry. This is your assurance, when you order Spencer Trailers, of receiving equipment that has been designed and built with years of experience in knowing what you require for your service.

There is a Spencer Trailer for every type of hauling. Write for information.

"VENDIENDO MERCANCIAS QUE NO SERAN DEVUELTAS— A CLIENTES QUE REGRESARAN"

Esto describe aptamente el arte de vender. Otra manera de expresar esta idea es: un buen producto significa clientes satisfechos. Permitanos dar énfásis a ésto. Durante 25 años, la compañia Spencer se ha dedicado con especialidad a la fabricación de remolques o vagones acoplados para todo tipo de transporte que se presente en la industria petrolera. Esta es su mejor garantia de que al comprar Ud. remolques Spencer recibirá el equipo que ha sido especialmente estudiado y construído con muchos años de experiencia y conocimiento de lo que Dd. necesita para su servicio.

Hay un remolque Spencer para todo tipo de transporte. Pídanos información detallada.

● *Above:* 4 wheel trailer

● *Above:* Pole trailer

● *Left:* Semi trailer

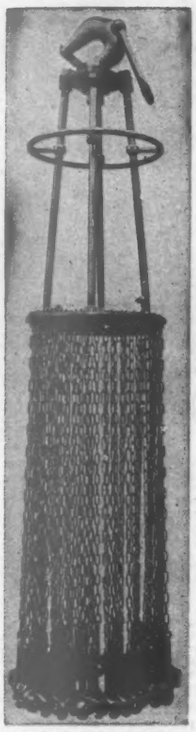
SPENCER TRAILER COMPANY — Augusta, Kansas

Export Representative: ***Representates de Exportacion:***

Lucey Export Corporation, 3505 Woolworth Bldg., New York City

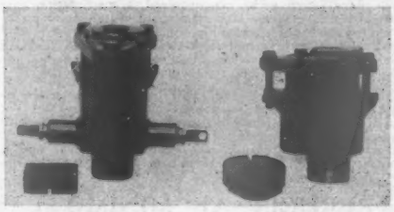
RATIGAN'S "SURE GRIP"
GRIPS, CLAMPS
BEAM HANGERS
SUCKER ROD ELEVATORS
SAFETY HOOKS
BELL NIPPLES, ETC.

Ratigan Swivel Rod Hanger



Outstanding features of the Ratigan Rod Hanger are (1) Swivel ball bearing insuring easy action, (2) Safety latch in the hook, which closes automatically, (3) Catchers so designed that in case slack occurs in the chain they will not come off the rod but will take a new secure grip, (4) When removing or adding stands it is only necessary to remove the retaining pin and space the stand to suit requirements. (5) Made in capacities of 1 to 100 or more stands. Catchers made in sizes for ⅝" to 1" sucker rods, and for ¾" to 1¼" macaroni tubing.

Ratigan Stuffing Boxes



Here are the only self-oiling stuffing boxes on the market. They receive their lubrication directly from the well and are designed to handle heading wells as well as regular pumping wells. No. 176, illustrated at the left above, can be easily and tightly shut off while repacking the box. Built for long efficient service.

Ratigan Production Equipment can be purchased at all leading supply stores

J. P. RATIGAN

1213 Santa Fe Avenue

LOS ANGELES CALIFORNIA

LIFELINE of a nation at war

OUR JOB: to keep the life blood moving

Never in all history have Americans been so deeply aware of their dependence on petroleum. . . . Upon its availability at points of use rests the warmth of millions, the mobility of our war machine, the welfare of our fighting men, the progress of the war itself. . . . With these facts in mind, it is a privilege to report that practically all of Gaso's facilities are now enlisted in the war effort — directed to the single task of building the pumps that speed war-vital liquids to their destination. . . . Gaso Pump & Burner Mfg. Co., 902 E. First Street, Tulsa, Oklahoma. Export Office: 149 Broadway, New York. Los Angeles: Service Oil Field Supply Co., 5333 S. Riverside Drive.

GASO PUMPS

FOR EVERY OIL INDUSTRY NEED

Why have TANK FIRES?

With the very rare exception of fires originating inside the tank—a tight tank is safe against fire if it is properly equipped with an Oceco Flame Arrestor.

Oceco Flame Arrestors are approved by Underwriters' Laboratories, Inc. They are protecting more than 350,000,000 bbls. of tankage (about 4 times the total average gasoline stocks of this country) . . . and have a perfect service record. No tight tank equipped to Oceco specification, even though located in the middle of a blazing tank farm, has ever been lost by fire.

The cost of Oceco Flame Arrestors is very small in proportion to the investment they protect. They reduce fire insurance—minimize the dangers of sabotage—and are indispensable to companies that carry their own insurance. Make your tanks fire safe and gas tight by using Oceco fittings throughout. Fully descriptive literature sent on request.

Con la muy rara excepción de incendios originados dentro del tanque, un tanque hermético es seguro contra incendio si está debidamente equipado con un extinguidor de llamas Oceco.

Los extinguidores de llamas Oceco llevan la aprobación de la Underwriters' Laboratories, Inc. Están protegiendo más de 350.000.000 barriles en tanques (cerca de 4 veces el total promedio de gasolina en este país) . . . y tienen una perfecta hoja de servicio. Ningún tanque cerrado, equipado según las características de Oceco, aun cuando haya estado colocado al centro de un grupo de tanques en llamas, se ha perdido a causa de incendio.

El costo de los extinguidores de llamas Oceco representa un gasto muy pequeño en proporción a la inversión que protegen. Reducen el seguro de incendio—disminuyen los peligros de sabotage—y son indispensables para las compañías que llevan su propio seguro. Haga sus tanques seguros contra incendio y herméticos al gas usando los accesorios Oceco en toda la instalación. A solicitud enviaremos información completa.

OCECO

Division of

THE JOHNSTON & JENNINGS COMPANY

891 Addison Rd., Cleveland, Ohio

Manufacturers of

VENT VALVES
MANHEADS
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FLAME ARRESTORS
RELIEF VENTS
TANK GAUGES
GAUGE AND THIEF HATCHES
STILL SAFETY VALVES
REFINERY LOOK BOXES
WATER DRAW OFF VALVES

TRATAMIENTO DEL AGUA

Invitamos la correspondencia de ingenieros y dueños de plantas, en cualquier lugar del mundo, que tengan problemas de corrosión, incrustación, organismos vivientes u otras dificultades, en conexión con el agua. Tenemos el tratamiento específico para el agua, lo mismo que las substancias químicas orgánicas, para corregir o rectificar cualquier caso que al presente esté reduciendo el rendimiento de su planta. Podemos introducir economías en muchos sentidos.

Nuestro departamento de exportación, que trabaja con nuestros varios laboratorios, gustosamente le explicará cómo hemos resulto muchos problemas de agua para empresas en diversas partes del mundo.

Sírvase pedirnos, en seguida, nuestros más recientes folletos sobre la extracción de incrustación, prevención de corrosión, proporcionamiento, remoción del oxígeno y control del alga.

D. W. HAERING & CO., INC.

Water Consultants

General Offices: 205 West Wacker Drive
CHICAGO, ILLINOIS, U. S. A.

Modern methods of petroleum processing

Here is a guidebook for plant managers and other refinery men—providing a complete, modern treatment of petroleum processing. It emphasizes the relation of refining to chemical engineering, covering fundamentals, many details of design and operation of petroleum equipment, economic aspects, etc.

PETROLEUM REFINERY ENGINEERING

By W. L. Nelson, Consulting Petroleum and Chemical Engineer. 2nd Edition. 715 pages, 6x9, illustrated. . . $6.00

This book provides a complete background of engineering theory in chapters on chemistry, laboratory evaluation methods, the physical properties of oil, and the unit operations of chemical engineering as applied to petroleum—as well as chapters that deal particularly with petroleum refining.

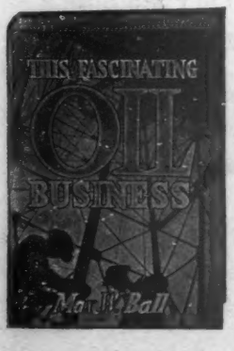
Illustrations or examples of almost all important calculations are included. The book builds up a few very important fundamentals and indicates how these may be used to work almost any type of plant problem, even those not directly associated with petroleum.

THE OIL AND GAS JOURNAL

TULSA, OKLAHOMA

This Fascinating Oil Business

By Max W. Ball



This dramatic story, not without humor, reveals in an accurate, authoritative and fascinating volume, the world source and significance of the oil industry . . . entertaining as well as informative . . . takes the reader from the geologic beginning to the latest developments in aviation gasoline.

$3.00 per copy

Order from: Book Dept.

The Oil and Gas Journal

THIS OLD RADIATOR WILL MAKE *One Aerial Bomb!*

TURN IN YOUR SCRAP TO WIN THE SCRAP!

YOU CAN MAKE THESE WORN-OUT "GADGETS" SERVE AGAIN

This old, worn-out, useless radiator once "kept the home fires burning"—made cosy the home you so dearly love, and now that it has served its useful life it has been stored away—companion to many other pieces of household fixtures.

Yet—it can serve again and help *protect* that home for which it was originally purchased. Placed in an open-hearth furnace with an equivalent weight in pig iron it will make an aerial bomb with which to bomb the Axis.

Ships . . . Subs . . . Tanks . . . Guns . . . all are 50 per cent scrap metal. Turn in your old metal and keep the steel mill furnaces busy. Rubber, Copper, Zinc, Tin, Burlap and Manilla Rope are also needed. Gather it up and take it to your nearest junk dealer, *NOW!*

REED ROLLER BIT CO.

HOUSTON, TEXAS.

Our wish for you?

It would be so easy if wishing alone would do the job . . . but all our efforts combined *will* make the wish come true . . . *some day, not too far away, peace, good will, security of all things worth working and fighting for.* May '43 see the dawn of that new day.

HUGHES TOOL COMPANY
HOUSTON, TEXAS